

TRANSACTIONS OF
THE AMERICAN
CONGRESS ON IN-
TERNAL MEDICINE
1917

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TRANSACTIONS
OF THE
AMERICAN CONGRESS
ON
INTERNAL MEDICINE

SECOND SCIENTIFIC SESSION, PITTSBURGH, PA.
DECEMBER 27-28, 1917

EDITED BY
JOSEPH H. BYRNE
ASSISTED BY
EDWARD E. CORNWALL

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NINETEEN HUNDRED AND EIGHTEEN

OFFICERS, 1917-1918

Glentworth R. Butler, President, Brooklyn, N. Y.
Elias H. Bartley, Vice-President, Brooklyn, N. Y.
*Heinrich Stern, Secretary-General, New York, N. Y.
Joseph H. Byrne, Assistant Secretary-General, New York, N. Y.
Augustus Caillé, Treasurer, New York, N. Y.

COUNCILORS, 1917-1918

Charles D. Aaron, Detroit, Mich., 1921.
James M. Anders, Philadelphia, Pa., 1919.
Noble P. Barnes, Washington, D. C., 1921.
Henry Wald Bettmann, Cincinnati, Ohio, 1918.
Louis Faugeres Bishop, New York, N. Y., 1920.
Harlow Brooks, New York, N. Y., 1919.
Joseph H. Byrne, New York, N. Y., 1920.
Edward E. Cornwall, Brooklyn, N. Y., 1920.
Judson Daland, Philadelphia, Pa., 1921.
Britton D. Evans, Morristown, N. J., 1921.
Henry A. Fairbairn, Brooklyn, N. Y., 1918.
Charles Lyman Greene, St. Paul, Minn., 1918.
John C. Hemmeter, Baltimore, Md., 1919.
Clement R. Jones, Pittsburgh, Pa., 1918.
John A. Lichty, Pittsburgh, Pa., 1919.
William H. Mercur, Pittsburgh, Pa., 1922.
Francis M. Pottenger Monrovia, Cal., 1921.
Thomas M. Reilly, New York, N. Y., 1920.
Charles E. de M. Sajous, Philadelphia, Pa., 1922.
Thomas E. Satterthwaite, New York, N. Y., 1922.
William H. Stewart, New York, N. Y., 1920.
Frederick Tice, Chicago, Ill., 1918.
Henry Enos Tuley, Louisville, Ky., 1922.
Joshua M. Van Cott, Brooklyn, N. Y., 1919.
Reynold Webb Wilcox, New York, N. Y., 1922.

*Deceased.

CONTENTS

	PAGE
Officers, 1917-1918	3
Councillors, 1917-1918	3
Address of Welcome, by John A. Lichty.....	7
Response to Address of Welcome, by Thomas F. Reilly.....	8
Address of the Vice-President, by E. H. Bartley.....	9
Address of the Secretary-General, by Heinrich Stern.....	14
Report of the Treasurer, by Augustus Caillé.....	15
Report of Deaths of Members, by E. E. Cornwall.....	16
Election of Officers.....	16
Roentgenology and the Internist, by C. D. Aaron.....	17
Roentgen Diagnosis of Diseases of the Chest, by G. C. Johnston	22
A Résumé of Roentgen Findings in Abdominal Pathology, by W. A. Evans.....	33
The Value and Limitations of Radiotherapy in Internal Medicine, by R. H. Boggs.....	45
Communicable Diseases Among Soldiers, by W. H. Parks'....	56
Some Problems of Cardiovascular Disease, by E. E. Cornwall..	65
The Rôle of Infection in the Production of "So-called Pernicious" Anemia, by Frank Smithies.....	71
Discussion of Papers of Drs. Cornwall and Smithies, by Drs. Wilcox, Field, Tice, Barr, Barach, Caillé, Ives, Stern, Friedman, Mercur, Haythorn, Smithies.....	88
Obituary Notice of Heinrich Stern.....	101
Constitution and By-Laws.....	103
List of Members.....	107

TRANSACTIONS OF
THE AMERICAN CONGRESS ON INTERNAL MEDICINE,
SECOND SCIENTIFIC SESSION

DECEMBER 27 and 28, 1917,
HOTEL WILLIAM PENN, PITTSBURGH, PA.

The Congress was called to order at 11 A. M., December 27, 1917, by the President, Dr. Reynold Webb Wilcox.

The President called on Dr. John A. Lichty to welcome the members.

DR. LICHTY: *Mr. President; Members of the American Congress on Internal Medicine and Respected Guests:* In behalf of the medical profession of the city of Pittsburgh I greet you.

We are conscious of the honor conferred upon us by the presence of the distinguished members of the American Congress on Internal Medicine. It would be a pleasure to me to recount the aims and accomplishments of the congress, as well as to speak of our obligations to those of its members who have done pioneer and advanced work in internal medicine, but I will leave that to be spoken of by others, and shall devote my few allotted moments to introduce to you things medical, which are characteristic of the great city to which you have come.

Th city of Pittsburgh may well be called the industrial center of the world. The present great world crisis has only emphasized this the more. Its mills and manufactories are well known. It is an inland town, but its river harbors receive, and send out vessels whose tonnage is equal to that of London and Liverpool combined. To us this is a well-worn, but agreeable expression, and while it may not at present stand the statistical test, it at least, as Mark Twain says, "sounds well." The city is centrally located. Someone, I do not know whether he is a member of the National Geographical Society, or only a statistician of a large insurance company, has said that Pittsburgh was only a night's ride from all the great cities of the United States. The railways and waterways have made its transportation facilities unsurpassed. With such resources and

facilities this city, with its surrounding community, has become a veritable workshop for the whole world. The relation of the medical profession to such an important geographical and industrial center has, up to the present time, been largely one of surgical repair, and the city, as a result, can boast of an amount and quality of surgery which can scarcely be surpassed in any other city of the world. It would be a pleasure to recount the names of men who have made themselves famous here in the practice of surgery during the past fifty years. It would include such men as Walters, known for his conservative surgery; Sutton, known for his early introduction of the principles set forth by Lister and Pasteur and Lawson Tait; the McCanns; the Dixons; and the brilliant, beloved and lamented Stewart.

While internal medicine has, in a way, kept pace with surgery, it is only recently that it has come into its own, as in preventive medicine, as well as in other well recognized activities. Pittsburgh formerly had the highest incidence and mortality of any city in the United States in typhoid fever. Through the direction of the late Eugene Matson, bacteriologist and director of the department of public health, the city has laid unsurpassed filtering beds so that the water of the city is now clean and typhoid has been entirely eliminated.

The laboratories of the city are now directed toward the prevention of diseases which are likely to occur in the industries which are here represented. Internal medicine has given valuable assistance in the elimination of the smoke nuisance. Diseases of the lungs in relation to smoke and soot have been particularly studied in the laboratories of the University of Pittsburgh School of Medicine, and in many other ways internal medicine has set about to bring to pass a prevention of diseases, accidents and calamities which have heretofore prevailed in our community.

The internists of the city, as well as the profession at large, appreciate the benefits which may accrue from the meeting of such a body as the Congress on Internal Medicine represents, and I again, in their behalf, welcome you.

DR. THOMAS F. REILLY, *in responding to the address of welcome: Gentlemen and Members of the Congress:* We are all glad to be here. Three or four months ago it was feared that we would not be able to meet here, as the conditions that the war has brought about have made it necessary for many learned societies to close

their doors, and therefore, they were not able to assemble here. Our president was on service in the United States army, and matters had gone so far that we were even warned by Dr. Richards that men had better stay at home and help to conserve matters by so doing. We were also warned by the Pennsylvania Railroad that we had better stay at home, and they refused to sell us return tickets. However, in spite of all this discouragement, we felt that this meeting was a necessity and that the men who are willing to go to all the expense and trouble that is entailed by travel in these times, are earnest in their desire to attend the meeting. We are glad to be in Pittsburgh, to show you that our interests are not parochial; that these meetings belong to the East and to the West. Every society that moves out West moves toward progress. (Applause.) Every progressive movement lies toward the West. The very spirit of terrestrial magnetism that is in evidence in this place, the fact that we are surrounded by so much iron and steel must have a physical effect, and therefore, indirectly, a mental effect, upon us. Dr. Lichty has pointed out that Pittsburgh is a suburb of Philadelphia, so far as scientific matters are concerned. There are numerous large foundations developing, in scientific matters, so that Pittsburgh is awakening to new scientific life. The names of Lichty, Mercur, and Johnston are evidences of this. They have made the name of Pittsburgh in connection with science, a household word.

It is said that there are three classes of millionaires—millionaires, multi-millionaires and Pittsburgh millionaires. I feel sure from my study of matters in this city that one may say there are three classes of internists—internists, great internists and Pittsburgh internists.

THE PRESIDENT: Last spring, when I was ordered on duty as an officer in the United States Army, I feared that it would be impossible for me to come to the meeting. I asked the vice-president, Dr. Bartley, to prepare a presidential address for you. Fortunately, I am able to be with you to-day. However, Dr. Bartley has provided for you a much better address than I could have done.

VICE-PRESIDENTIAL ADDRESS

By DR. E. H. BARTLEY

Brooklyn

Gentlemen and Members of the Congress: At the opening of this, the second meeting of the Congress of Internal Medicine, I con-

gratulate you on the evidences that we are to have an interesting and instructive session. We miss the faces of many we had expected to have with us to-day. We cannot refrain from expressing a feeling of sadness for the occasion which has called away thousands of our brethren to the colors in the national defense. Not only the young and ambitious but those of reputation and years of experience of which the Congress is largely composed have gone to help to win this war. That this comparatively young organization must be affected by their absence was to be expected. It was to be expected that the attendance would be decreased, and your council seriously considered whether it might not be advisable to omit holding the congress this year. We hope you will agree with us that it was best to carry out the program in spite of the danger of the diminished attendance and the loss of enthusiasm born of numbers.

One of the greatest incentives to the life of a society is new members. The membership of this Congress is large and it should be larger. It has increased about one hundred since the last meeting. It should be doubled during the next year, and it can be if the fellows will all do their part. Any qualified physician engaged in the practice of internal medicine, or in laboratory research pertaining to it, may be proposed for fellowship, which proposal should be made in writing to the council through its secretary. It is very their doors, and therefore, they were not able to assemble here. desirable that the fellows should be careful, in proposing candidates, to select physicians in their localities whose reputation and character are above reproach. We could easily double our membership by circularizing the medical profession of the country, but this is not desirable as many would respond who might be undesirable, or who would be unknown to the council, and they would have no means of intelligent selection of the proper ones. The council must depend largely upon the good judgment of the fellows for the selection of the names of the physicians of their own locality. If this plan is carried out the congress will be composed of selected representative physicians from every locality; a fellowship of which we shall be proud, because it will include the best purely medical practitioners of the country. This will make this congress distinctively a body of physicians engaged in the practice of internal medicine, or the investigation of internal pathological conditions. I would urge upon every fellow to use his best endeavor to help make this congress a great organization by securing as candidates for fellowship, the best physicians of his acquaintance. We must select with even

greater care those fellows of this congress whom we propose for fellowship in the college. This is a distinction and an honor which should only be bestowed for some notable contribution to the progress of internal medicine, or to the public good.

It will then mean that the holder of this certificate has done something to warrant distinction, and we believe this will stimulate others to do something for the advancement of scientific medicine.

To a very great extent the progress of scientific medicine, except that connected, either directly or indirectly, with military medicine or surgery, is at a stand still, throughout the world, because of the war. Everywhere the hospitals and the laboratories have been hampered by the loss of members of the trained staff. Internes are scarce and difficult to obtain, and much of their work is being done by students not yet graduated. There are many of us who because of age and other unavoidable circumstances could not go to the front, and not a few who from the character of their training should not go, must do their bit at home among the civilians; not less loyal, not less willing to serve their country in spheres no less useful, in hospitals, assisting in the work of the draft boards, or in the homes of their several communities. The aims and objects of our organization, so ably set forth in the president's address of a year ago, and which you have had time to read and digest, have not changed nor will they change with the changing times. As the manhood of the world is being so heavily drawn upon by the war, the attention of the medical profession should be turned to the supreme importance of the conservation of the health and life of the people left at home.

The lessons of the selective draft have impressed upon us the necessity of working for the betterment of the race. The statistics of some of the local boards who have been examining recruits for the army and the navy, show that as high as sixty per cent., or more, of the men who came before them were unfit for the service, according to the standards set. This was a surprise to most of us and should be a cause of concern for the future of American manhood and womanhood. When there is added to this large percentage of physically unfit, the maimed and shattered remnants of these young men we are now selecting to send over the seas, new and serious problems must be met. To those of us who remain in civil life these problems should appeal with great force. These lessons of the war, or more properly, the preparation for war, must come

home to us, and they should be met as part of our duty to the nation.

There is already a great field for the medical profession in efforts to correct the defects in those who have been found physically unfit, so far as these defects may be remedial, and more especially perhaps, in those who will soon become liable to call, by reason of age. Physical defects are more easily corrected in early life than at draft age. It should not be a matter of pride, that, owing to the laxity of the medical profession in their efforts to correct the physical defects of children, the boards of health and education have been compelled to take the matter up as a function of the state, or of public health. Much is being done in this line by the medical inspection of schools, and by the periodical examination of the employees of large establishments and of city employees. It is a hopeful sign that this matter is being taken up by labor organizations. It cannot be gainsaid that the medical profession has been remiss in not taking the initiative in this line of preventive medicine. They have generally left it to the boards of health, or to life institutes or insurance societies.

Is it not an opportune time and the duty of such bodies as this, and similar organizations of representative physicians, to undertake some concerted action looking toward the physical improvement of the masses of the people? The time is, or ought to be, that the practice of medicine should not be confined to the diagnosis and treatment of the diseases of the acutely ill, but should include all measures for the betterment of the race; certainly to the careful supervision of the health, development and defects of the young of pre-school age, before they come under the supervision of the school authorities. It has been stated by competent authorities that there are in the public schools of New York City more than 20,000 children suffering with serious heart lesions. It must be admitted that many of these if properly handled before the age of six years, may be converted from serious into at least benign conditions. As examples of other remedial conditions met with in early life, we may mention the various focal infections; of the middle ear, tonsils, nasal sinuses, teeth, and intestine; defective nutrition, defective growth, deformities, defective or abnormal endocrinous glands, tuberculous infection and lues. It is the general practitioner and the internist, not the specialist who must primarily either deal with these conditions or be responsible for their neglect. Every internist has these physically defective children brought to him for consulta-

tion and he cannot entirely shift the responsibility upon the pediatricist.

The most vulnerable age is the pre-school age. Most of the tubercular-infections and many of the organic heart diseases begin at this time. It is at this age that those nutritional defects begin which are apt to continue to later years and affect the efficiency of the future man or woman. In this connection, there is no more important field of investigation than that which is claiming the attention of some biological chemists to-day, relating to the study of the effects of different foodstuffs on the development and growth of animals. There is a great need of a better understanding of the principles and practice of feeding the young, so as to promote growth and development to the best advantage. We have not developed the art of feeding the human animal to the extent that the agriculturalist has that of feeding farm animals. What we have already learned from recently conducted feeding experiments has given us an explanation of the etiology of a number of diseases, now known as deficiency diseases, such as scurvy, berri berri, pellagra, etc. We have reason to hope that this line of inquiry will teach us how we may overcome the handicap of a poor heredity by proper application of the principles of feeding, with perhaps, the discovery of an active principle promoting growth which can be added to the ordinary diet. Some efforts have been made to find such substance, with very limited success, in the internal glands. Investigations made by the New York Board of Health show that from eight to twelve per cent. of the children in the schools of that city suffer from such a degree of malnutrition as to need supervision, in their opinion. This represents about 125,000 school children in that city whose nutrition needs supervision. That this is not due entirely to the high cost of living is shown by the fact that the figures are higher for 1916 than for 1917. Many of these children will grow up to inefficient men and women. The hope for the citizenship of the future of this country is not in the children of the educated and wealthy classes, for they are not prolific in the production of their kind. It is the children of the so-called laboring classes, and the ignorant foreign-born parents who fill our public schools; or those who are least able to appreciate these facts and their importance. It is these children who will make up the majority of the future men and women of America. Whether they maintain the traditions of the past will depend upon how well the medical profession, the schools and churches do their patriotic duty by them.

This war has made this country the dominant nation of the world. When this crisis is past, we must be ready to meet the great industrial war that is to follow. Europe will look to this country for men and material resources to help them to reconstruct and rehabilitate their countries. Shall we be equal to the task? I believe we shall, but it will depend upon the energy and efficiency of our people, east, west, north and south. Efficiency depends on good health. Unless this war should terminate very soon, there will be a new and very great task imposed upon the medical profession of this country, in the reconstruction of the men returning to us from the trenches. These will require the neurologist and internist as well as the orthopedist. There is a great work ahead of us, and much of it will be unremunerative, and which we shall accept as a national duty. We cannot afford to be regarded as slackers in this duty. We have only words of praise for those of our profession who have so nobly and with great personal sacrifice, enlisted in the national service. The loyalty of those who remain at home is under observation and on trial.

DR. R. W. WILCOX: The problem of the organization of a society of internists has been an important one to the medical profession. There is one member of this society who thought of this and planned it, and worked day and night toward its organization, for years before this society was born. You all know him, gentlemen; I am sure that I need not make any further comment in regard to the work of our secretary-general.

ADDRESS OF THE SECRETARY-GENERAL,

BY DR. HEINRICH STERN

New York City

Gentlemen: I came here to-day to show my interest in the society as I think it is necessary to push the organization along this year. I was told that there would not be a meeting, but I insisted upon it, although the men who were on the committee were in some trepidation. They said that the Pennsylvania Railroad would not sell return tickets and asked me to call the arrangements off. However, I feel that the meeting is necessary at this time; we are only beginning to be involved in the war, and next year we may be much more deeply in, and we physicians have to be prepared to see it through.

This year it might appear that we had not done much, but the council has had ten meetings. We have added to our list 125 to 130 new members, and I feel that that is very encouraging for a new organization. We must have about 450 members now. That, of itself, shows that the congress on internal medicine was a necessity. The work last year was largely left to individuals, and I may say that Drs. Pottinger and Aaron did the bulk of the work in getting members for our organization. Dr. Pottinger is a born agitator. He has seen a great number of people, and we have not had to advertise as the College of Surgeons has. Dr. Aaron has made great personal efforts and has got us the best men of the profession. During the year, the secretary has taken upon himself to publish the transactions. Dr. Cornwall has rendered the most loyal and effective assistance, and thanks are due to him, more than to me, for the results. If there are any special questions that anyone wishes to put to the secretary, in regard to either the American Congress on Internal Medicine or the American College of Physicians, I shall be more than glad to answer them.

DR. R. W. WILCOX: Judging from the work of the committee on arrangements, it is not a matter of great importance that we could not get return tickets. We appreciate the hospitality of Pittsburgh, and we are ready to stay here. We will now listen to the report of the treasurer.

REPORT OF THE TREASURER

DR. A. CAILLÉ: The treasurer would like to add a remark on the reading of his report. During the first months of organizing a new society, the expenses are enormous, compared with what will occur later. Many expenses have to be met that will not happen again. The society has met all these unusual expenses and finds itself upon a firm financial basis.

DR. THOMAS REILLY: Dr. Joseph H. Byrne and I have audited the report and find it correct.

DR. R. W. WILCOX: And you have certified to that effect?

DR. REILLY: Yes.

DR. R. W. WILCOX: In every society death must come, and during the past year some of our members have left us. Dr. Edward E. Cornwall will present this subject more fully to you.

DR. CORNWALL: The members who have died are: Dr. Claude L. Wheeler, editor of the *New York Medical Journal*, for many years, a man of delightful personality and very well known in the profession. Dr. Henry L. Coit, of Newark, whose name is intimately connected with movements toward the furtherance of infant welfare, and who was one of the first to advocate and insist upon certified milk. Dr. LeRoy Satterlee, who was widely known and much esteemed. He was in practice as an internist for many years and was connected with the teaching staff of the New York Dental Institute.

The president announced that the next order of business was the election of officers, and that the council of the congress, acting according to the by-laws, and as a nominating committee, presented the following nominees for office, and they were unanimously elected for the year 1918-1919.

President, Dr. Glentworth R. Butler.

Vice-President, Dr. Elias H. Bartley.

Treasurer, Dr. Augustus Caillé.

Assistant Secretary, Dr. Joseph H. Byrne.

Council: Drs. Reynold Webb Wilcox, H. Enos Tuley, Charles E. deM. Sajous, Wm. H. Mercur and Thomas E. Satterthwaite in the Class of 1922, and Dr. Frederick Tice in the Class of 1918.

Notice of an amendment to the constitution was presented to the society, to be acted upon at the next annual meeting. This amendment, offered by Dr. Bartley, was in effect that a second vice-president should be elected as one of the officers of the congress.

Dr. Caillé then moved that a vote of thanks be tendered to Dr. Wilcox for the efficient and dignified services he had rendered to members of the association, as their president. He felt personally that he would very much miss Dr. Wilcox in this capacity. Dr. Satterthwaite seconded this motion and a rising vote of thanks was tendered.

DR. R. W. WILCOX: *Gentlemen*, I wish to thank you for your expression of appreciation. I came into this organization at the instigation of the secretary-general and I esteem it a great honor to have been your president for two terms. Whatever energy I have

put into my task I have regarded as only what the organization well deserved; whatever talents I have shown in the execution of my duties I have been glad to devote toward making a success of the society. I feel that in this way I may have been of service to my profession and to my country.

ROENTGENOLOGY AND THE INTERNIST

By CHARLES D. AARON

Detroit, Mich.

The days of experimentation with the roentgen ray are far from past. No sooner has a new technic been devised for certain manipulations, or an instrument perfected, than fresh ideas and discoveries demand recognition, and what is considered a great success to-day may be superseded to-morrow. Roentgenology is still in an active stage of evolution and bids fair to remain so for a considerable time to come, until, perhaps, some genius shall discover the very nature of the rays and solve on a scientific basis what must now be empirically gathered from laborious experimentation and observation.

However, it is gratifying to record the fact that the rapid advances which have been accomplished in the evolution of this new science, from its crude inception to the comparative perfection of the present day, have given it a quality of positiveness which renders it a valuable aid in both diagnosis and treatment.

In the early period of the roentgen era, some claims were made for the ray which could not be substantiated and which were promptly discarded, surviving only in the minds of pseudo-scientists who have no standing in the profession. Having successfully passed through the storm and stress of its early history, the science has acquired a definite significance which commands universal professional respect. Colleges have introduced the study of the subject, and the laboratory of Roentgen diagnosis and treatment has become one of the essentials, not only of every well-equipped hospital and kindred institution, but even of methodic modern office practice. The academic standing of roentgenology is assured, and no less its practical value. Still, its service to the medical profession is not what it might be with more perfect technic and a better correlation between the science of roentgenology and the science of medicine.

One of the stumbling blocks that hinder the progress of roentgenology is the lack of uniformity in technical details. For example, there is as yet no generally accepted standard test meal preceding the roentgenologic observation of the gastrointestinal tract. Not only do the American, English, French, German and other test meals differ for apparently no other reason than that they have been devised or promulgated by a leader to whom allegiance is naturally rendered for racial or national reasons, but various authorities in the same country have been unable to agree upon a standard. The matter of expense and also the idiosyncrasy of the patient are factors in the case, but not to such an extent as to render an agreement on a desirable standard impossible. The value of roentgenographic examination consists not only in the information it furnishes to the examiner in an individual case, but also, and even to a greater extent, in the possibility of comparing results in a large number of cases which have been examined by different men in different offices, institutions and countries. Such a comparison is impossible unless a standardized test meal is used, together with a standardized technic of administration. Want of standardization is one of the greatest drawbacks in the evolution of a new science, and although the roentgenologic fraternity admits the fact, the conditions are not likely to be changed as long as the leaders, who have set up what they consider standards for themselves, expect others to adopt them and are unwilling to compromise.

This may be and probably is due to their meager experience with test meals other than their own, inasmuch, as each roentgenologist will, unless actuated by broader motives, adhere to his own method and refuse to experiment with others. But is it too much to hope that recognized authorities will ultimately allow themselves to be convinced by demonstrable facts, to sink their personal proclivities and to settle upon a standard which a competent majority proclaims to be acceptable? The advantage in obtaining comparable results for the furtherance of the practical usefulness of the art ought to carry sufficient weight with it to lead them to agree upon uniform procedures in this respect.

Another reason why internists have looked askance at the intrusion of roentgenology upon the domain of diagnosis is that they rightly objected to the idea of roentgenologic examinations displacing the ordinary routine diagnostic methods. There may have been a trend in that direction on the part of early roentgenologists who allowed themselves to be swayed by youthful enthusiasm, but such

is fortunately no longer the case, and the specialists of the new science do not claim to render any but supplementary service in diagnosis. At the same time, it should be admitted that in some conditions the roentgen ray reveals more pathology than the clinical diagnosis, provided the interpretation of the shadow pictures is correct. In incipient tuberculosis, for instance, the early signs may be roentgenologically detected while clinical symptoms are as yet absent. Cases of osteitis fibrosa cystica have been reported in which the roentgenograms were so characteristic that it would have been difficult to mistake them, and yet the diagnosis could not have been made from the clinical pathologic picture. All roentgenologic findings are, however, only placed in the hands of the clinician for what they may be worth. They will serve to direct his attention to the probable presence of conditions which have not yet advanced far enough to produce clinical symptoms. But in view of the fact that the roentgen ray furnishes only shadows which have to be interpreted, and not complete reproductions of actual pathologic facts, no roentgenologist worthy of the name would think of suggesting that his findings should take the place of a regular clinical examination.

Another point I would emphasize as a truth beyond all possible cavil is that a knowledge of pathology is an absolute necessity for making a roentgenologic examination and interpreting the shadows correctly; and that accuracy in diagnosis by this means requires an equally thorough clinical knowledge, because the roentgenographic findings must be correlated with the clinical history and the present condition of the patient. The right interpretation of the fluoroscope or plate is dependent upon this knowledge. How is the roentgenologist to have a clear mental perception of the changes consequent upon disease, unless pathology is an open book to him? It is with roentgen ray as with the microscope; both reveal the condition of tissues in health and disease, but the revelation cannot be interpreted with any pretence to usefulness, except in the light of accurate knowledge of larger subjects—*anatomy, physiology, histology, and pathology.*

Similarly, it is not too much to ask that the skilful roentgenologist should also be a good clinician. Indeed, all these demands have now been recognized for some time by leading specialists in the art. But there are still survivals from early times, when roentgenography was likened to photography and when nothing was supposed to be required of the "artist" but the ability to "take a picture." These

times are gone, and the present arraignment is only intended to emphasize the fact that the roentgenologist who is insufficiently versed in the intricacies of the anatomical, medical and surgical requirements, or who is inexact in the practical application of his knowledge, must yield the field.

These demands, of course, do not apply to the assistants employed in a large roentgenologic laboratory whose principal requirements are a technical knowledge of the instruments and apparatus they are expected to handle. In other words, there are two phases to be considered in the problem of turning roentgenology to successful account: The brain of the physician who directs the proceedings and interprets the findings, and the technician who carries out the instructions. This situation naturally suggests the desirability of every physician being able to act as his own roentgenologist where, as a matter of fact, very few clinicians have a sufficient knowledge of the roentgenologic theory and practice to justify their attempting an interpretation of a series of plates.

To be sure, there are many instances in which interpretation is easy. But such instances should not mislead us into indolent credulity. Gastric pathology is a case in point. It is not difficult to recognize, in autopsy or at operation, definite lesions or pathologic alterations, such as an hour-glass stomach, perforating gastric ulcer, or pyloric obstruction; but in the clinic identical symptoms may be due to stomach disease or, for example, to cholecystitis or chronic appendicitis. Therefore, the primary lesion must be found, if possible, and it is the business of the roentgenologist to make out certain identifying marks that will indicate the cause of the patient's symptoms. Some of his problems may indeed be difficult, for the pathologic process may be in the gall bladder, in the appendix, or in the colon. Here he can show his experience as an observer, and also his technic in application.

All this points to the supreme desideratum—standardization. Both the methods and the technic need it, the more so since Roentgen diagnosis has, after all, its limitations as well as its possibilities. It is to be regretted that, as none other, this new specialty allows such diversities in technic and such variations in the conclusions from the findings.

Many cases have been observed which illustrate the need of a universal technic, as a diagnosis based on roentgenograms obtained by one technic is apt to be discredited by a subsequent roentgenogram of the same case made by a different man and with a different

technic. This drawback is to a certain extent overcome by experienced roentgen men stating in their reports the details of the technic, the position of the patient and of the roentgen tube, together with all the other incidentals; but in the first place, his precaution is in many cases ignored, and in the second place the necessity for it would largely disappear, at least in routine examinations, if a universal technic were employed. The successful application of the roentgen art is largely dependent on the relative position of patient and roentgen tube, and the visualization of certain shadows depends upon this very fact, as for instance in the localization of foreign bodies, gallstones, fractures and dislocations; thus the individual skill, ingenuity and experience of the roentgenologist must determine the technic. The personal equation is and will remain a deciding factor in the success or failure of a roentgenographic examination. However, this does not do away with the further fact that even the work of the expert would be more expert, and the altruistic value of his work to the community immeasurably enhanced, were the general trend of his work based on standardized principles, so that the results could be intelligently scrutinized, compared and repeated.

Standardization is required in many other important points connected with roentgenology in addition to test meals and the position of the patient under examination, but the object of this paper is rather to call attention to this requirement on general principles than to go into technical details. Among the latter may be mentioned the deplorable absence of a standard of measuring the dosage, and the quantity and quality of the rays to be employed in a given case. The attempts have been many, and the difficulty of the task is admitted, but its solution is no nearer to-day than it was years ago, and there is no tangible result in sight. Similarly, attempts have been made to standardize the application of the rays over definite areas of the body, especially in deep application for therapeutic purposes, to make sure that no one part of the body receives more or less than its intended share in repeated treatments. While suggestions have been made along this line from time to time, the roentgenologic section of the profession is slow in discussing, accepting or rejecting them with a view to arriving at anything like standardized procedures. The general feeling which prompts them to adopt an attitude of "masterful inactivity" or "watchful waiting" is not due to indolence or apathy, but probably to a realization of the fact that their experience has not yet sufficiently matured to justify

the adoption of more or less irrevocable plans. But this very consideration should be an incentive to increase and perfect their experience, and this much-desired result can only be won by a universal comparison of results and, consequently, by standardization of the important steps bound up in the practical application of the art.

ROENTGEN DIAGNOSIS OF DISEASES OF THE CHEST

By GEO. C. JOHNSTON

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The subject indicated in the title of this paper is so extensive that it would be impossible to more than touch lightly on the various points in the time allotted to this purpose.

In making an examination of the chest, it is always wise to proceed according to a certain routine, in order that one may not be misled by the history of the patient or other elements in overlooking some important point upon which the entire diagnosis may rest.

In our clinical work we, therefore, make it a rule in every examination of the thorax to note the following points:

- a. Heart—size, shape, position and action
- b. Aorta—size, position, dilatation, aneurysm, calcification
- c. Lungs—apices.
 1. Illumination of enforced inspiration (light reflex)
 2. Relative distensibility
- d. Diaphragm
 1. Degree of visibility
 2. Curvature
 3. Excursion (equal bilaterally?)
 4. Fixation (adhesions)
- e. Mediastinum
 1. Size
 2. Shape
 3. Presence of opaque bodies
 4. Tumors
 5. Aneurysm
 6. Adenopathy
 7. Persistent thymus

Following this general survey, we now proceed to examine in detail. We look first for the shadow of the trachea, which upon the

screen appears as a bright band anterior to the median line and fading behind the aortic arch. If there be any deviation of the tracheal shadow, we desire, at once, to know why the displacement and suspect pressure, which requires explanation.

Further down we notice the hilus shadows on either side, well marked on the right and hidden on the left behind the heart, cast by the bronchi and great vessels, and the numerous lymphatics about the roots of the lungs.

Toward the periphery the lungs become more transparent, but we are able to trace out the shadows cast by the broncheal tree with its accompanying lymphatics and shadows. If the alveoli are healthy in all portions of the lungs, lungs will be equally translucent.

Increased radiability showing bright upon the screen and black upon the plate may indicate a tuberculous cavity or a bronchiectasis, dilatation, emphysema or pneumothorax, while decreased radiability might be caused by a pneumonia, lung suppuration, thickened pleura or pneumonokoniosis, syphilis or malignant disease.

A decreased area of radiability surrounding a more or less circular area of increased radiability would suggest an abscess cavity.

In an examination of the lungs we study not only lung tissue, but the pleural cavity and the diaphragm. Thus in the study of an instance of lobar pneumonia by means of the x-ray (which study is being made and more in the military hospitals abroad), we might expect to find the following phenomena present.

FIRST STAGE

Lung. Light shadow over one lobe

Pleura. Increase in pleural shadow

Diaphragm. Visibility lowered and excursion limited

SECOND STAGE

Lung. Dense shadow of one or more lobes

Pleura. Increase in pleural shadow

Diaphragm. Excursion and visibility lost

THIRD STAGE

Lung. Irregular, ill-defined areas of density involving a lobe or lobes

Pleura. Clearing

Diaphragm. Excursion and visibility returning

The above table is taken from Crane's excellent article on the skiascopy of the chest which appeared more than fifteen years ago. I mention this point in order that you may see that there is nothing new in the examination of the chest by means of the x-ray.

Now let us consider for a moment the appearances which we might expect in a broncho-pneumonia. We will find first that both lungs are affected, irregular shadows over both lungs, visibility of diaphragm slightly impaired, excursion of diaphragm unimpaired.

In pulmonary oedema, on the contrary, the screen appearances of the thorax is very unusual. If the oedema is extensive we will find

1. Heart and aortic shadow lost
2. Diaphragm shadows lost
3. All chest landmarks lost

Emphysema will show an increased radiability of the lung on one or both sides confined to the emphysematous areas. Atelectasis, due to blocking of the bronchus, perhaps from foreign body, will show a decreased radiability of the portion of the lung extending to that part of the bronchial tree, the main trunk of which is blocked.

LUNG TUMORS

The primary tumors of the lung most often seen are the sarcomata and the appearances are very striking. In the advanced stages one or several globular masses of rather uniform density may be seen to invade the lung tissue. The tumor wall is sharply defined, the demarcation between tumor and lung being easily observed. This is in contradistinction to carcinoma of the lung. The remainder of the lung tissue may be perfectly healthy. These tumors attain considerable size, from one to four inches in diameter, and may give rise to very few pulmonary symptoms, unless so situated as to make pressure on some of the great vessels.

Carcinoma of the lungs, usually secondary and quite prone to produce metastases from the breast or prostate, occur frequently and give an appearance of very light lung suppuration, but without the bronchial marking. The lung tissue involved resembles the body tissue as in periosteal sarcoma. The disease appears at the hilus and radiates out into the parenchyma of the lung. In early stages it appears as thoroughly interlobular, but later may involve the lung very extensively.

Diseases of the pleura are quite easily diagnosed by means of the x-ray. This is the first axiom. *A visible pleura is always pathological.* We may differentiate by means of the x-ray.

1. Acute pleuritis
2. Acute pleuritis with effusion
3. Chronic pleuritis
4. Empyema
5. Hydro-pneumothorax
6. Pyo-pneumothorax
7. Interlobular pleurisy

PLEURISY WITH EFFUSION

- a. Lung retracts.
- b. Dark shadows with sharp upper border, which border changes shape with position of patient.

(Only true with incomplete effusions.)

Pyothorax same as above except darker shadow.

In complete left pleural effusion:

Heart displaced to right.

Diaphragm shadow effected in erect posture, but can be seen if you can place patient in Trendelenburg position.

Dark shadows rarely extend to apex.

Differential diagnosis between complete pneumonic consolidation and complete pleural effusion is *almost impossible* with x-ray.

CHRONIC THICKENING OF PLEURA

Diffuse haziness of a part of one side of chest or lessened radiability. Diaphragmatic excursion normal.

INTERLOBULAR PLEURISY

Simply an encysted pleurisy, wedge shape, base outward and the pleura above and below thickened.

(Pulmonary abscess begins at hilus and extends out and rarely reaches pleura.)

HYDRO-PNEUMOTHORAX AND PYO-PNEUMOTHORAX

1. Dark shadows in chest, diaphragm lost
2. Changes with position of patient

3. Upper border very clear.
4. Level of fluid seen on shaking patient (waves)
5. *Very great* increase of radiability above the shadow

Pneumothorax causes a striking appearance on the screen or plate if the pleural sac has been free from adhesions so that the lung is free to retract when the negative pressure is relieved. The entire half of the thorax may appear as though the lung had been removed. Close examination, however, will show a retracted lung lying against the mediastinal shadow.

Many mistakes are made in the diagnosis of conditions within the pleural cavity. It is sometimes very difficult or even impossible to differentiate between an opaque fluid in the pleural cavity and an unresolved pneumonia involving the entire lung. This condition is by no means rare and will sometimes require the use of the aspirating needle in order to clear up the diagnosis.

Pulmonary abscesses seldom extend to the periphery of the lung and require very careful localization. It is very unwise to examine a patient for the determination of the presence of a pulmonary abscess after coughing and expectorating pus. It is much better to wait and give the abscess cavity a chance to become filled with pus, at least partially, and then examine in the erect posture or semi-recumbent. Areas of lung suppuration without cavities resemble portions of pus drowned lung, such as are seen after the blocking of a bronchus by a foreign body has continued for a long period of time.

In all examinations of the chest by means of the x-ray, it is well to remember that you are differentiating various physical conditions of the lungs and endeavoring to interpret these in terms of pathological entities. Very frequently the interpretation cannot be made accurately, and no attempt should be made to so interpret the findings without careful correlation with the other clinical findings, such as history, etc.

If one has had considerable experience in examination of disease of the thorax, he is inclined to thoroughly scrutinize the region of the diaphragm in every instance and to carefully observe the degree of visibility and the form and the excursion of the diaphragm.

Pulmonary tuberculosis is diagnosed by the x-ray only in so far as we care to interpret certain physical conditions, which are thus beautifully shown as tuberculous and assume that these conditions are always caused by the bacillus of Koch.

Personally I would hesitate to make a diagnosis of pulmonary tuberculosis in any but the most advanced stages by means of the

Roentgen ray findings alone. Taken in conjunction, however, with the physical signs, temperature and weight record and history, trivial x-ray findings may, when so associated, acquire great significance and enable the all important early diagnosis of tuberculous infection in many patients to become an accomplished fact.

It, of course, is ridiculous to state that we do not see the tubercular bacilli with the x-ray. Neither do I believe that we see a peculiarly-shaped habitation of the bacilli as one might expect to see muskrat homes, nor do I believe that there is any strictly pathognomonic pulmonary change attributable solely to the tubercle bacilli with one hundred per cent. of accuracy, but the fact remains that there are several rather characteristic pulmonary changes which we have learned by experience to expect to see in patients suffering from tuberculosis and have come to attribute these changes to the pathology of the disease.

The earliest of these changes is the so-called fan, so well described by Dunham, best seen in thin chests and early cases. This should only be studied in excellent stereoscopic plates.

Dunham says, "the characteristic tuberculosis plate marking consists of a fan-shaped density with the base of the triangle toward and near the pleura, the apex toward the hilum and connected to the hilum with a heavy trunk. The pathological lesion within the lung which causes the fan-shaped density is a cone that has its base to the pleura and its apex toward the hilum. The density within this fan-like area varies greatly. The radiating linear markings may either be interwoven and broadened, studded, obscured by a filmy cloud effect, mottled, matted together or entirely blotted out. One of the most striking characteristics of the tuberculosis picture is the varying degree of change in the different trunk groups in contrast to the general homogeneous change in diseases which might simulate tuberculosis, also the lack of continuity with which the trunks may be involved. Thus we may have the vertebral and second interspace trunks on the right side involved and only the first interspace trunk on the left side. Further, it is very striking to note the constancy with which early or slight lesions in the adult are limited to the trunks of the lower lobes.

"If the fine linear markings of a given trunk are fuzzy or are faintly obscured by a cloud effect and the fan appears to be wide open, *active tuberculosis* is suggested. On the other hand, if the linear markings beyond the trunk and the fan are partially closed, a healed lesion is suggested. This condition is emphasized if it is

accompanied with heavy, coarse interweavings which reach to or near the periphery. The heavy trunks between such areas and the hilum are usually broad and dense."

Practically this fan-shaped appearance is that which would be caused by any low grade inflammatory process which has spread by continuity of mucosa.

In advanced instances of the disease you see:

1. Dunham's fans
2. Lung suppuration
3. Tuberculous adenopathy
4. Thickened pleura
5. Formation of cavities
6. Local pneumonias

The degree of activity of a tuberculous lung lesion is inversely proportional to the distinctness of outline or limiting border. If outline is sharp, disease is quiescent; but if it shades off into outlying tissue, it is active.

The above cannot be seen on the screen, but you should use low unit radiation for fluoroscopy and should make stereoscopic pictures for final detail.

1. Patient should not breathe (Diaphragm is indicator, if visible)
2. Patient must not move
3. If active tuberculous area will be smoky, foggy, hazy, blurred, indistinct

If disease is quiescent plates will show

1. Sharp demarcation
2. Sharp contrast
3. Dense small shadows
4. No fog, smoke or haze
5. Dense shadows of regular outline and sharp demarcation denote healed process

DIFFERENTIAL DIAGNOSIS

Localized long suppuration resembles alveolar tuberculosis, but

1. It is confined to one or more areas
2. Fan-shaped area larger
3. Does not extend to periphery of lung
4. Whole process denser
5. Patients are very sick

HILUS TUBERCULOSIS

1. Is a disease of childhood
2. Is a peribronchial tuberculo-adenopathy

Glands break down, liquefy and break through into a bronchus and by extension now becomes an alveolar tuberculosis. It may never go on to above extent and rarely does. If outline be indistinct and blurred, process is active. If dense clear cut outline, gland is probably calcified, healed and quiescent.

WARNING

Any infectious disease of childhood or bronchial irritation of inflammation will enlarge the peribronchial glands, but these will usually promptly clear up as convalescence progresses.

FOREIGN BODIES IN RESPIRATORY PASSAGES

Nature—Anything small enough to get in by inspiration.

Location—From nose downward (never be satisfied with screen examination solely).

Favorite location is behind the heart shadow; more go down right bronchus.

Always make lateral and two antero-posterior views to locate a foreign body which is transparent to x-ray.

1. History
2. Area of atelectasis or lung suppuration with foreign body at handle of fan
3. Two antero-posterior views should be made—one with sternum on plate, one with back on plate

If small enough to go through the larynx it may be found in the trachea, bronchus or lung. The foreign body may be expected to gravitate downward until it reaches a bronchus whose size prevents admission.

The foreign body may be opaque or transparent to the x-ray, but it requires localization irrespective of this fact. On several occasions a foreign body supposed to be in the lung has been found in the nose and on many occasions in the bowel. The screen is not of much avail in this particular instance, and it is much more satisfactory to make very rapid plates of the chest, making two antero-posterior and one lateral.

If a foreign body is transparent to x-ray, it may reasonably be expected to cause irritation at its seat with some resulting inflamma-

tion and possible blocking of the bronchus, resulting in atelectasis and later localized suppuration.

My associate, Dr. Grier, has published in the *American Journal of Roentgenology*, the results of our experience in the examination of very many instances of foreign bodies of various types in the air passages. It is, therefore, unnecessary for me to add anything to what he has said. ("Roentgen Examination of Foreign Bodies." G. W. Grier, M.D.)

THE HEART

Roentgen examinations of the heart are performed for the purpose of obtaining the following data:

Size, shape, position, condition of aorta, presence or absence of pericarditis.

Size—It seems to me that clinicians should be interested in this if only to determine whether or not a heart is of sufficient size to take care of the circulatory requirements of the individual under examination without being expected to unduly exert itself. This is simply a problem in hydraulics, and I am quite certain that any observer will, in a short time, have his attention called to this fact.

On making a rapid fluoroscopic observation of a heart, having previously examined the individual and taken his blood pressure, the observer should be able to state whether or not, in his judgment, any given heart is sufficiently large for its work. If the heart is over size, it is from dilatation or hypertrophy. If it be hypertrophied its behavior, its muscular action, its excursion, its apical retraction will immediately proclaim it such. Similarly, if it be dilated, the very lack of the foregoing characteristic muscular activity will inform the observer of that fact. A dilated heart gives the impression of a heart in chronic diastole. When a healthy heart, whether hypertrophied or not contracts the apex retracts. The activity of the heart is determined by the retraction of the apex, the diminution in size or change in area, and change in position of the heart due to its systolic rotation on the great vessels on which it is suspended, in conjunction with the rate of contraction and expansion.

The only way to learn anything about this particular branch of medicine is to carefully and intelligently examine the heart by every method available, then study the same heart with the screen and in this way acquire the ability to interpret for yourself the visualization of the heart in action so beautifully seen upon the screen.

The shape of the heart varies greatly. You will soon be able

to divide them into transverse, vertical, globular, drop and compressed.

Drop heart has no pathological signification. It is usually small and occurs in patients having long trunks and general visceroptosis.

The transverse heart on the other hand indicates a distinctly dangerous cardiac condition. It is observed most frequently in those men whose abdomen exceeds in circumference their chest, who are what are commonly known as "stomach athletes." These are the types recorded in the daily print as dying of acute indigestion or cardiac failure immediately subsequent to an elaborate banquet.

A displacement of the heart is, of course, immediately observed; pleurisy with effusion, particularly right-sided pleurisy may cause considerable displacement.

The congenital dextracardia is always worthy of comment, but the marked cardiac displacements are those observed as a result of rearrangement of the thoracic contents due to old chronic fibroid phthisis.

Pericarditis with effusion is very frequently overlooked and very often diagnosed as a simple cardiac hypertrophy. It is well to remember that the re-entrant angle, which is found by percussion and which is found to have disappeared upon percussion in this condition has not actually disappeared but is rather *accentuated* when the heart is examined upon the screen. This confusion is bound to cause mistakes. The diagnosis of pericarditis with effusions is rather better made by the fact that a portion of the heart shadow, its auricular shadows and shadows of the great vessels at the root of the heart, is almost lost, due to the distension of the pericardium with fluid. Moreover the cardiac activity is very greatly reduced, apparently the apical retreat being no longer noticeable.

The various changes in contour of the heart consequent to valvular insufficiency would require an afternoon for their discussion. Moreover they have been already beautifully described in Roentgen literature. They will, therefore, not be further considered.

The aorta is best inspected by means of the screen and considerably more attention should be paid to determination of aortitis than has been done in the past. The writer claims that an early determination of aortitis with proper treatment, thereof, would result in an increasing rarity of aneurysm.

Any deviation in size or shape of the aorta requires explanation but it does not necessarily mean aneurysm.

The size, shape and position of the arch is best studied before the screen and no diagnosis of aneurysm should ever be made until the superior portion of the arch has been studied in the lateral position.

Syphilitic aortitis may be frequently diagnosed upon the screen by marked increase in the density of the descending aorta.

Expansile pulsation of aneurysm means an impulse synchronous with the heart beat. It must be remembered that transmitted impulse is imparted to any tumor in the mediastinum which may be in contact with the aorta. The following table may also note the differences between tumors of the mediastinum and aneurysm.

ANEURYSM

Regular outline, spherical
Pulsatile and expansile
Painful when producing pressure
Atrophy of bone
Bruit marked
Density high
Cardiac dyspnea
Cardiac hypertrophy
Cough brassy
Shadow continuous with aorta
Density high

TUMORS

Outline irregular or spherical
No bruit
No cardiac hypertrophy
No cardiac dyspnea
Often metastatic
Rapid onset
Irregular density
Aorta can be differentiated sometimes from tumor
Density may be low

No mention has been made of mediastinal abscess, the result of caries of the cervical or dorsal spine, and when such a diagnosis is made it is usually an accident.

The writer realizes that many books could be written on the subjects touched upon and the idea of this paper is simply to re-awaken the internist to the value of the fluoroscope and plate in the examination of the chest as a means of stimulating his acuity in other methods of physical examinations as well as the advantage of having all the possible evidence in any given case.

No roentgenologist can make successful studies of the chest unless he be enough of an internist to appreciate all the various forms of pathology which one may expect to find therein.

No roentgenologist can make successful studies of the chest in having been associated with many excellent internists, men well informed as to gross pathology, symptomatology, etc. Anything that he knows along this line is due to his past association with such men as C. Q. Jackson, Litchfield, McKelvy, Lichty, Alexander, Jones, Mercur, Klotz, MacLachlan and many others.

A RÉSUMÉ OF THE ROENTGEN FINDINGS IN ABDOMINAL PATHOLOGY

By WILLIAM A. EVANS

Detroit, Mich.

Your president, in his address last year, paid tribute to the science of roentgenology in this fashion "To it internal medicine owes much, not only in indicating new avenues of progress, but as well in scientific demonstration of the verity of what empirically we have established as facts in internal medicine, and we have made but a beginning." But many roentgenologists have become so enthusiastic over their method of examination they have forgotten the ordinary clinical methods and even gone so far as to hold in disdain the work of the clinician. There is certainly no basis for such self-glorification, for sober consideration of our results must convince us that our conclusions are drawn falsely.

It is in this spirit of humility that I address this meeting. I hope to present some of our problems and, at the same time, to indicate how you, as internists, can help advance our specialty and thus advance medicine generally. But my humility must not prevent my giving expression to thoughts which came to me during my recent review of the late literature on differential diagnosis of abdominal conditions. In one of the volumes of "monographic

medicine" published in 1916, the author dismisses the subject of roentgenology of the gall bladder with these words: "An x-ray made by an expert will sometimes show the shadow of a gallstone." Roentgen aid in gastric cancer receives the consideration, "Examination by x-rays shows an interference of peristalsis and sometimes notching of the stomach wall;" and in the differential diagnosis of chronic appendicitis, no reference whatever is made to the roentgen ray. Apparently this writer has not had the advantage of association with, and the co-operation of a competent roentgenologist, and neither has he followed roentgen literature, for otherwise the work of George, Case, Carmen, Crane and many others must have shown him the merits of roentgenological study of abdominal pathology. I trust the time will soon come when an author will not have the temerity to disregard so thoroughly and completely such a valuable aid in differential diagnosis as the roentgen method has proven itself to be.

It will not be possible for me to take up in detail any organ or group of organs. I will rather have to be content with suggesting the possibilities and problems in the demonstration of lesions of the several abdominal structures. Before taking up the individual headings, it should be understood that the roentgen study is carried out, in the first place, by both the fluoroscopic and the roentgenographic methods. Both methods have their indications and merits, but one cannot be used to the exclusion of the other. It should also be understood that the examinations are made both in the upright and horizontal positions, and that suitable considerations have been paid to the preparation of the patient.

Diaphragm. In the study of the diaphragm, the fluoroscopic method is the most useful and the erect position is preferable for such study. The first thing to be noted is the contour and relative height of the diaphragm lines, and then the contour, in detail, of each diaphragm. The height of the diaphragm lines is varied by abdominal conditions, such as enlarged liver, enlarged magenblase, distended splenic flexure, subphrenic abscess, or, in fact, any large abdominal tumor, or even effusion. When the diaphragm on either side shows waves or undulations, one can strongly suspect either abdominal or chest pathology. The structure of the diaphragm and its enervation renders certain fibres subject to irritation from abdominal organs, and it is the reflex irritation from abdominal lesions which produces the irregular contraction of the diaphragm muscles and, as a result, the mammillations. This condition has

been especially noted in gastric ulcer. The plate method of examination is of particular value in determining the presence of a subphrenic abscess. In this case, it is customary to look for a bubble of gas, this appearing between the pus level and the diaphragm, the presence of air permitting the pus to assume a straight line, and this finding may be overlooked in the fluoroscopic observation. Usually the condition of the patient does not permit the erect posture for but a brief period, and this, in itself, would force the using of plates.

Pancreas. The study of the pancreas is rendered difficult both by its structure and its relations. Well-developed cysts of the head of the pancreas have been recognized during a roentgen examination, by the fact that there has been a displacement and change in the relations of the pylorus and duodenum. Carcinoma of the pancreas has also been diagnosed by the disturbance in outline and relations of the duodenum produced by the presence of a new growth.

A careful search of the literature failed to reveal a report where pancreatic calculus had been demonstrated by the roentgen method of examination, but there is no reason why these should not be demonstrated, and no doubt the shadows have been overlooked or confused with gallstones or other abnormal shadows. In this instance, it would seem that with the co-operation of the internists, cases showing pancreatic disease should be referred to the roentgenologist for a careful study of the pancreatic region for calculus.

Liver. The indications for roentgenologic hepatic study are limited. An enlarged liver is demonstrated at times on account of the distortion of the diaphragm line or from the displacement of the abdominal contents. In our service, we were able to demonstrate that a large tumor in the upper right quadrant was probably a cyst of the liver, this being verified by operation.

Gall Bladder. For some years, the study of the gall bladder by the roentgen examination was confined simply to the demonstration of calculi and adhesions. Until recently, no routine examination of the gall bladder region was made, the question of adhesions being determined during the study of the duodenum. It has been the custom for some time to describe the so-called gall bladder position of the duodenum, in its relation to the pylorus, and also to explain certain deformities of the duodenum by periduodenal adhesions complicating a cholecystitis. When the duodenum was held toward the median line, and somewhat upward, when the

pylorus extended a little far to the right, when the mobility of the duodenum was reduced, and when there was tenderness associated with manipulation of the duodenum, we have assumed that there was gall bladder disease from the demonstration of an occasional gallstone, and these rather accidentally, we have advanced to the position where some roentgenologists report the demonstration of at least fifty per cent. of gall bladder deposits. One worker has stated that his percentage is eighty per cent., but he published no figures to support his statement. However, in our reports, we always call attention to the fact that negative evidence of gallstones simply indicates that no stones are present which have a lime content of two and a half per cent. or more.

But what is probably more important than the demonstration of gallstones is the demonstration of the gall bladder itself. While, as far as we know, we have never been able to demonstrate a normal gall bladder, we are certainly finding on properly exposed plates outlines which have been proven to be cast by a pathologic gall bladder. The conditions demonstrated have included hydrops of the gall bladder, empyema of the gall bladder, and chronic thickening of the gall bladder wall. Inasmuch as the normal gall bladder is at least very seldom demonstrated, we can safely assume that the shadow of the gall bladder definitely indicates pathology.

Spleen. The differential diagnosis of tumors in the upper left quadrant can be aided by the demonstration of the splenic outline. In order to show this organ, it is necessary to distend the stomach with gas, and also to have considerable liquid in the stomach. With the patient on the right side, with the above conditions complied with, the splenic outline is frequently very well shown.

Peritoneum and Mesentery. The roentgen method of examination is frequently useful in the differential diagnosis of extravisceral new growths. The usual findings are those of a displacement of the stomach, small intestine, or colon, these, of course, being studied best by being outlined with the usual opaque salt. We have been able to diagnose differentially a low abdominal mass as a dermoid cyst, since we identified shadows in the tumor region which were those of teeth. The very important subject of adhesions in the abdominal cavity, of course, is best studied by this method of examination, fluoroscopy alone being the most satisfactory procedure, inasmuch as this permits of palpation and the demonstration of pain points. The distribution of the barium in tubercular peritonitis is characteristic, there being filling and distention of certain loops of

the small bowel with barium, and distention of other loops with gas.

Urinary Tract. The question of the roentgen diagnosis of urinary calculi is so well known that the matter will be given little consideration here. In these cases, the value of the roentgen examination is not in the diagnosis of a calculus, but more to serve as a guide in treatment and a guide in prognosis. By no other method of examination can the size, shape and number of stones be learned.

The question of referred pain in renal calculus should be mentioned at this time. In our service, I recall four cases in which the symptoms were all on one side, and the examination revealed a shadow of calculus on the opposite side. This does not necessarily mean that the pathology was entirely one-sided, but it does mean that there can be a bilateral pathology with just unilateral symptoms.

New growths and disease other than calculus can be well studied, provided the proper technic has been carried out in obtaining plates of the kidney regions. In the rare exceptions that the plates do not show the kidney outline, one can usually suggest the presence of a perinephric abscess. In this condition, there is usually a uniform density from the crest of the ilium on the affected side to the last rib. In every other case, it is possible to obtain a kidney outline, and unless the plates obtained show this, further exposures should be made.

The invaluable aid rendered by the study of the filled bladder, ureters and the pelves of the kidneys with an opaque solution is well known, and nothing new has been recently brought out along this line.

In connection with bladder symptoms, by making posteroanterior plates as well as anteroposterior, we have been able to demonstrate the shadow of the prostate, both that of a chronic prostatitis and a prostate modified by a new growth.

A relatively large number of cases are referred to the roentgenologist for examination of the urinary tract with simply the history of frequent urination, pain on urination and lumbar or inguinal pain. Four years ago, in reviewing a large number of plates made of cases referred for suspected calculus, I was struck with the large number of spine lesions which could be detected on the plates made of the midureter region. It occurred to me that possibly there was a distinct connection between the spinal lesions and the symptoms of urinary calculus, and a paper was written for the American Roent-

gen Ray Society under the title "The Syndrome of Urinary Calculus Caused by Spinal Lesions." Since that time, when the examination for stone is negative, we feel it our duty to make a detailed study of the lower spine and to report any changes found. It has been clearly and definitely demonstrated that bone lesions of the lumbar and lumbosacral regions frequently manifest themselves in disturbances in kidney function, micturition and lumbar and inguinal pain.

The variety of lesions producing these symptoms is great. Simple displacements or rotations, inflammatory processes involving the articular facets and anomalous development of the fifth lumbar body or faulty development of the first sacral segment have all been found in these cases. Of course, any pathology in the spine which would cause an inflammatory reaction in the soft tissues could be a factor in reflex irritation.

Gastrointestinal Tract. Before taking up the detailed pathology of the gastrointestinal tract, the question of a method of examination should receive careful consideration. There are at present two distinct methods of examination, one the so-called single meal, and the other the so-called double opaque meal. Personally, I think this is a very vital matter, and one that should receive the earnest consideration of gastroenterologists, for until there is a standard technic for the examination of the intestinal canal by the opaque meal, there will be difficulty in correlating the results of the work of different laboratories. Personally, I can see no objection whatever to the single meal, and believe it is the proper method of procedure. There is a distinct disadvantage in the double meal, in that it is reasonable to suppose that a large dose of salt such as barium or bismuth is bound to affect the reflexes of the intestinal canal. In at least ninety per cent. of patients who are examined in our laboratory for gastrointestinal conditions, we find that on the day following the administration of the barium salt, the patients seem to be markedly or even entirely relieved of their symptoms, this improvement usually continuing for several days. In fact, we hear frequently that patients having had the barium study do not return to their physician, inasmuch as they have been entirely relieved of their symptoms.

To be more definite, a case was referred a few days ago for a gastrointestinal study, with the tentative diagnosis of gastric ulcer. The first examination revealed a distinct pylorospasm, with delayed emptying. The following day, a second opaque meal was given.

There was an entire absence of spasm, and a well formed duodenal cap, and an even and normal escape of the gastric contents. The condition in this case was not one of gastric ulcer, but was one of gastritis secondary to a septic condition of the mouth.

The argument may be advanced that even a single meal interferes with the normal function, and we presume that there is possibly some truth in this claim, and in many cases, the roentgenologist does take into consideration the action of a large amount of barium in the intestinal tract.

The objection to the single meal by the advocates of the two-meal method is that the condition of the terminal ileum is the greatest factor in reflex gastric conditions, and if the examination is made with the terminal ileum empty, many pathological conditions would be overlooked. Since in no other way can we be sure that the terminal ileum contains food except that the food has an opaque salt content, then it must follow that the detailed study of the stomach should be made when it is determined that there is still food content in the terminal ileum. Granting that the contention of the two-meal advocates is correct, there is still no objection to the single method in my mind, inasmuch as an examination begun within twelve or fourteen hours of a meal would still permit us to examine the stomach which would be under the influence of the terminal ileum content, for a normal terminal ileum can have no influence on the stomach, and a disturbed ileum will show retention from the evening meal by the time of the morning examination. This, of course, would call for the gastric examinations to be begun between eight and nine in the morning. This is one of the problems which can only be settled by the aid and co-operation of the gastroenterologist.

At this point, I would like to make a distinction in the cases referred from the surgeon for examination and those coming from the internist. From my experience, I find that the examination of the gastrointestinal tract for surgeons is much easier than in the cases sent from the internist. That is, with greater frequency do we demonstrate actual lesions, while in the instance of cases referred from the internist, it is frequently a matter of disturbed function. Little diagnostic skill is necessary in demonstrating hour-glass contraction of the stomach or a perforating gastric ulcer, or a chronic duodenal ulcer, or a large gastric carcinoma, or any other lesion with gross anatomical changes. It is these cases which have probably gotten the roentgenologist in the habit of making

a roentgen diagnosis, rather than simply reporting the roentgen findings.

Another factor in the formation of the roentgen habit of making diagnoses is the varying abilities of the men referring cases for examination. The large majority of the cases coming to the office have had practically no scientific examinations made, and the physicians referring the cases rely almost entirely upon the roentgenologist for a diagnosis. I have been in the habit of dividing physicians into three large classes, one class to whom is almost entirely unknown the real scientific study of a case, a second class who have kept abreast with the various advances in diagnoses, but whose energies are so dissipated that they are not sufficiently familiar with the roentgen findings reported to properly interpret them, and then the third and smaller class, who use all the various methods to obtain a diagnosis in a given case.

To the first class, we have, in the order of things, to make a roentgen diagnosis, and in these cases we feel that we are entitled to a history and also some of the other physical findings, and these are made in a hurried way during the ordinary roentgenologic examination. This is, of course, not scientific, but most of you who are familiar with general practice will appreciate the conditions under which this plan is made necessary.

To the second class, we usually report our findings, and interpret them in the light of the patient's history and symptoms.

To the third class, we have adopted the method of simply reporting our findings, and contenting ourselves with making possibly a few suggestions. We believe that this third method is the ideal one and that the roentgenologist should not be called upon to make a definite diagnosis unless he has the privilege of going over all the results of the other examinations.

A year ago, Charles H. Mayo, in an address before the American Roentgen Ray Society, said "To stand well with the surgeon, the roentgenologist should be specific in his conclusions, avoid verbose description of his findings, and when unable to make a diagnosis, frankly report the case as indeterminate." This should, and no doubt does, apply equally well to the internist, and to you, as internists, then, I will state the roentgen findings of the more common pathological conditions of the gastrointestinal tract.

The matter of size, shape and position of the stomach and the matter of the length and relations of the component portions of the colon have been demonstrated, we think, to be of little, if any,

clinical value. As Mills of St. Louis pointed out, the contour and relations of these organs simply conform to the patient's habitus. The internist has not fully appreciated this condition, we believe, for we are frequently called upon to determine exactly the above mentioned points in connection with the stomach and colon. The futility of the ordinary abdominal belt has also been clearly demonstrated.

We can classify the findings in gastric ulcer under the two general headings of direct and indirect, the direct being a demonstration of a definite change resulting from the ulceration, and the indirect the disturbances in function. The most common direct findings are (a) the bismuth fleck representing the ulcer crater, (b) the filling defect in the gastric outline, and (c) the organic deformities other than defects, such as hourglass contraction. The indirect findings are (a) spastic manifestations, (b) abnormalities in peristaltic waves, (c) disturbed motility, (d) unusual filling of the duodenum and (e) pressure pain points.

The very complete work on gastric carcinoma which was published by Dr. Smithies was recently reviewed, and I am in full accord with all that he has stated as regards the value of the roentgen examination in gastric carcinoma. Still, in practice, it does not work out as one would believe from reading Dr. Smithies' comments. I am sure that every roentgenologist frequently is able to demonstrate a gastric carcinoma when the condition was not thought of clinically, even when the case had been worked up by a competent internist.

The chief, and frequently the only finding in gastric carcinoma is a filling defect. Depending on the location, there will be disturbances in motility. For instance, with a carcinoma involving the cardiac end of the stomach, there is usually early emptying. In carcinoma involving the middle pole, the emptying time is frequently not disturbed, and, of course, in carcinoma of the pylorus, there is usually obstruction. Probably the chief values of the roentgen ray in gastric carcinoma are the demonstration of the exact location of the lesion, the possibilities of surgical intervention, and the prognostic value.

Undoubtedly the majority of cases coming to the internist with gastric complaints have conditions outside of the stomach which produce the symptoms. The gastric symptoms resulting from small intestinal, appendiceal and colonic conditions will be considered separately under the several headings.

The interpretation of the findings of pylorospasm and gastric retention should not be made without carefully considering the question of these findings being the result of a gastric manifestation of tabes. Not infrequently we have suggested syphilis as being the etiologic factor in pylorospasm and retention, and later tests have proven our suggestion correct. The question of organic deformities of the stomach due to syphilis is one of importance. Undoubtedly a large number of cases presenting a tumor of the stomach have been diagnosed as carcinoma, when in reality they were the result of syphilis. The roentgenologist should always suggest the necessity of differentiating between carcinoma and syphilis by the other methods of examination.

The most constant and important finding in duodenal ulcer is duodenal deformity. Following the classification by Carmen, of the Mayo Clinic, there are four types of deformity, these depending somewhat on the extent of the ulcer and on the amount of scar tissue formation. The four types are the pine-tree, the niche type, the incisura, and the small dense bulb.

The indirect evidences of duodenal ulcer are hypertonus, hyperperistalsis and hypermotility of the stomach, the six-hour residue in chronic ulcer, antrum dilatation and gastric spasm.

The question of deformity of the duodenum cannot always be explained by changes in the duodenal wall, for frequently the disturbances in outline and in filling is the result of duodenal bands. The duodenum also is frequently influenced by reflex conditions from other abdominal conditions.

The cause of reverse peristalsis of the duodenum has not been definitely determined. It is claimed by some that reverse peristalsis is incident to respiration, but we are sure that this is not the case. We have not had a sufficient number of observations of this condition to determine its exact significance, if any.

Small Bowel. In the upper small bowel, comparatively few lesions are found. Most frequently, the disturbance is the result of adhesions, and this point has been mentioned elsewhere in this paper. Constrictions resulting in obstruction have been demonstrated, and it has been proved at operation that an ulcer has been the basis of the pathology. Another infrequent finding is diverticulitis, the identification of which should not be difficult.

Normally, the opaque meal will have passed into the colon at twelve hours. Any residue after this time should be classified as ileal stasis. The importance of the ileal stasis as a factor in

gastric symptoms is second only to the appendix. The causes of ileal stasis, as determined by the roentgen method of examination, are adhesions and kinking, spasm of the ileocecal sphincter, and incompetency of the ileocecal valve. Under the head of adhesions, should, of course, come the atypical mesenteric bands known as Jackson's membrane. The question of incompetency of the ileocecal valve is most often demonstrated by means of the opaque enema, but at times, by frequent observations of a given opaque meal, it can be definitely shown that the cecal contents have been regurgitated into the terminal ileum.

The importance of the appendix in gastrointestinal disease cannot be overstated. The roentgen evidences of appendiceal disease are, for the most part, direct. The most common is retention, the degree of retention usually determining the importance of the appendix as a factor in the gastrointestinal symptoms; (b) tenderness localized to the appendix; (c) kinking or angulation of the appendix, indicating that appendiceal drainage would be imperfect; (d) irregular filling suggesting either concretions or constrictions; (e) adhesions; (f) incompetence of the ileocecal valve; (g) dilated duodenum with no other local pathology.

The most frequent indirect sign of appendicitis or even pathology in the right lower quadrant is the so-called right-sided position of the stomach. We frequently are able to suggest from the first gastric study that the condition is one of right quadrant pathology from the fact that the stomach is drawn downward and far to the right.

In cases where the appendix cannot be seen, one is justified in suggesting a diagnosis of appendicitis if there is tenderness of the cecum on deep pressure, and if there is cecal fixation and retention, or cecal spasm. We have also held that when manipulation of the cecum or pressure over the cecum produces pain in the epigastrium, in the absence of other disturbances a condition of appendicitis is probably present.

The question of the appendix filling with barium is one that requires further study. It is claimed by some workers that the fact that the bismuth enters the appendix at all is evidence of pathology. Others hold that this is probably normal and that the question of pathology is dependent entirely upon how long the barium remains in the appendix. This is one of the problems which we think is worthy of a further study.

The importance of appendiceal retention in the absence of appen-

diceal fixation or tenderness is undetermined. We frequently see, especially in the aged, appendiceal retention for forty-eight or seventy-two hours, and as far as we can determine, there were no symptoms whatever from the appendix. In general, however, we can state that an appendix which retains barium after the cecum is empty can be definitely classified as pathologic. The assumption that a diagnosis of appendicitis, without any modifying statement, follows a demonstration of any of these conditions is no more correct than the assumption that because a gallstone has been demonstrated, there is no other abdominal pathology, or even that the stone is of diagnostic importance. In our opinion, appendiceal disease is quite often secondary to disturbances of the terminal ileum and cecum, and appendicitis simply complicates rather than is the occasion of the ileal or cecal pathology. This error explains the large number of appendectomies which fail to relieve the symptoms for which the patient was operated.

The differential diagnosis between gall bladder disease, ureteral stone and appendicitis is greatly aided by the complete roentgen study of the right side. We are all familiar with the high appendix which gives a very clear clinical picture of gall bladder disease, and also of the pathological retrocecal appendix which is with great difficulty differentiated from kidney or ureteral disease.

In connection with the colon, the most important condition for the internist is colonic stasis. The most common cause of constipation, as shown by the roentgen examination, is involvement of the pelvic colon in adhesions. Aside from the fixation of the bowel and tenderness associated with manipulation of the part, the presence of spasticity of the pelvic colon is always suggestive of adhesions. The various deformities of the cecum, cecal fixation and sharp angulations at the flexures are also associated with disturbed colonic motility. The diagnosis of carcinoma or other new growths involving the colon are diagnosed by the demonstration of a definite defect in bowel outline or by an obstruction produced by the involvement of the lumen with the tumor. The most satisfactory method of examination of the colon for new growths is by means of the opaque enema.

Numerous cases of constipation are demonstrated to be the result of definite spasticity of the colon. It is our observation that spastic constipation results in reflex gastric symptoms as a rule, while general colonic stasis is productive of symptoms of so-called auto-intoxication.

As to the study of the colon to determine, if possible, the cause of chronic diarrhea, the association of this condition with disease of the appendix and with intestinal stasis is relatively common. The intestinal stasis can be either the type associated with spasticity of the colon or with dilatation.

I realize I have attempted the impossible in trying, in a brief paper, to give a just consideration to my title. But I sincerely believe that if the internist will approach the subject as I have suggested and become familiar with the full possibilities, and learn to correctly associate the findings with the pathology and symptoms, that the result will be advantageous. And further, there should be no good reason for postponing the roentgenological examination until all other tests have been carried out or diagnosis postponed for further observation. This is a criticism which many internists justly deserve, but one which will be surely avoided when the aid we, as roentgenologists, can render, is fully appreciated.

THE VALUE AND LIMITATIONS OF RADIOTHERAPY IN INTERNAL MEDICINE

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When I was requested to discuss the value and limitations of radiotherapy to internists, I at once appreciated the fact it was not until lately that the internists or consulting physicians realized the value of this agent, though they often asked for a surgical consultation in cases which were in no manner surgical. When you stop to consider that over ninety per cent. of the cases of tubercular adenitis can be permanently cured by the roentgen rays without leaving any deformity, that the symptoms of exophthalmic goitre are relieved in a large percentage of the cases, and that Hodgkin's disease and lympho-sarcoma will disappear in nearly every case and are not any more prone to recur than after a surgical operation, then it is apparent this subject must be carefully studied by the internist who may be compelled to consult with someone inexperienced. No one who has seen a large number of the cases just mentioned, will fail to realize what an important place radium and the roentgen rays take in many of the internal diseases. A great deal of good work also has been done and reported on dis-

eases of the blood and blood forming organs, the value and significance of which is not generally realized by the medical profession.

To-day the internist is taking perhaps the most important position in the practice of medicine, and consultation with him is certain to be of supreme importance in this class of cases. The internist should be as adept in what can be accomplished by radiotherapy as the surgeon should be in cancer. Most internists would not want to decide on what should be done with cancer patients, and most surgeons should not want to decide with the so-called internal diseases. In the early days of radiotherapy, before it had become a specialty, this branch of medicine was usually left to the surgical side of the hospital. It was very often forced upon the assistant surgeon who was interested in surgery instead of radiotherapy, and he frankly stated that he had no interest in this department. Consequently he never studied the technic and usually did poorer work after two or three years' experience than he did at first. The assistant to the internist to-day would be in the same position. Fortunately, it is realized that radiotherapy has become a strict specialty. Unfortunately much of the work is being done by beginners without a consultation with someone who has had the proper experience.

In order to determine the therapeutical value of the roentgen rays, it is necessary to study their physiological action. It has been demonstrated that the same percentage of roentgen rays effect tissues differently, and this explains how lymphatic glands will undergo a degeneration, with almost an entire obliteration of the chain, without seriously influencing the surrounding tissues. All tissues which have undergone pathological changes react more quickly and intensely. Both macroscopical and microscopical examinations show how the rays act on the pathological and normal tissue. The selective action of the rays for epithelial cells explains how certain diseases are cured while others are unaffected.

The activity of development of the cellular constituents of a part and the amount of cellular proliferation modify the reaction. The more active the cellular proliferation, the more readily the cells respond to radiation. The stage of maturity to which the cells have attained has a decided influence upon the cellular reaction; and in the case of epithelial and endothelial cells, it has been found that cells fully matured react less readily than those in the process of development. The fully matured lymphocytes and leucocytes respond readily, while arrest of development and

retrogressive changes only are produced in the immature.

The only appreciable result of radiation upon the red blood corpuscles is a decrease in their physical resistance; no alteration in the haemoglobin has yet been established. The white cells, on the other hand, are very susceptible to radiation, the leucocytes showing marked degenerative changes, mainly in the direction of the fragmentation of the nucleus. The protoplasm of the cells, more particularly of the polynuclear variety, undergo a degenerative change, being broken up into small masses, which either refuse to stain or stain badly. This plainly shows that their physiological evolution is hastened.

The epithelial cells, both cutaneous and parenchymatous, are affected in proportion to their vitality. Dead cells are unaffected, fully matured cells are very resistant, and the more embryonic forms of cells are more easily affected, a retardation in development preceding degenerative metamorphosis. Where healthy structures are exposed to the action of the rays, the primary changes of degeneration and destruction of the epithelial cells have been found to precede proliferation of the connective tissues, the vascular changes being a later manifestation of radiation.

In applying the rays, it is hardly necessary to state that the severity of the reaction can be varied from a mild erythema to necrosis, according to the kind and amount of rays absorbed.

GOITRE

Tremendous advancement has been made in recent years in our knowledge of the physiology, pathology and treatment of the ductless glands. Improvement has been shown in exophthalmic goitre by treating either the thyroid, thymus or ovaries alone, but until lately in most of the cases, the thyroid alone had been treated. It is known that thyroidectomy does not always remove all the symptoms of Graves' disease and that many times the patient is greatly benefited by roentgen treatment of the thymus and ovaries afterwards. Many of the European investigators consider hyperplasia of the thymus closely allied with exophthalmic goitre, and some have reported that the thymus is enlarged in ninety per cent. of cases. Attention has been called to the fact that, when the thymus gland is greatly enlarged, the patients do not stand operation well and that such patients suffer severe shock from operation, sometimes followed by death. Since the thymus gland seems to play such an important part in producing the symptoms of Graves' dis-

ease and the danger from operation is greater when the thymus is enlarged, roentgen treatment of the thymus at least should be given.

Goitre has been divided into three groups: first, the ordinary type or adenoma, which does not produce any symptoms except enlargement of the thyroid gland and is often accompanied by more or less nervous symptoms; second, the simple goitre, with beginning toxic symptoms; and third, enlargement of the thyroid, often accompanied by changes in other ductless glands, with typical symptoms of exophthalmic goitre.

There are three well known forms of treatment of goitre at the present time; namely, medical, roentgenological and surgical. The medical should always be considered first, as changes in the thyroid gland are produced by various conditions such as infections, fatigue, pregnancy, shock, etc., and many times the symptoms will disappear when the patient is kept at rest under medical treatment. There is, however, no question that treating a case too long medically may be followed by permanent damage to various structures of the body, and since roentgen treatment has proved efficient and is not dangerous in the hands of a skilled roentgen therapist, there is no necessity of delaying the treatment too long.

Now with our present knowledge of roentgen rays in the treatment of goitre, patients should never be allowed to reach a precarious stage before this method of treatment has at least been given a fair trial. Treating the thymus and ovaries is not sufficient, but the thyroid should usually receive the greater proportion of the treatment. Often patients suffering from goitre in the advanced stage are very easily discouraged, and to avoid disappointments it is important that you should have a thorough understanding with the patient before treatment is given.

Patients with simple goitres, having only enlargement of the gland and accompanied by nervous symptoms, will receive much benefit from a few roentgen treatments. The enlargement, which may be only in one lobe can be checked and reduced in size, and the patient's health will be greatly improved. Raying a lobe of the thyroid is not any more dangerous than removing it surgically, because if the treatment is given carefully you can stop on the safe side. In cases of simple goitre, which are just beginning to show symptoms of the exophthalmic type, roentgen treatment should be given at once, followed up by one or two series, because nearly all of these will be promptly relieved.

In the exophthalmic type, in which the symptoms are marked and damage has been done to other structures of the body, we must be careful in giving a prognosis as well as in giving the roentgen treatment. The gland in these cases is often easily affected, and the patient may be suffering from damage of the heart, nervous system, etc., and instead of hyper-secretions of the thyroid entirely, the patient is almost ready to pass from a hyper into a hypo condition. Then very heavy roentgen treatment is contra-indicated.

Since radium has been used in sufficient quantities, and screening and cross-firing have been employed, goitre has been successfully treated with radium. The results by radium are about the same as those produced by the roentgen rays. Possibly if large doses of radium are employed, properly screened and placed at the proper distance, the symptoms respond slightly quicker than when the roentgen rays are used. Radium has the advantage that it can be employed without moving the patient.

The first improvement noted is the reduction of the pulse rate. Various authorities have found the decrease in pulse rate in ninety per cent. of the cases, and it is possibly the best guide we have in regard to giving the treatment, because it has been pointed out that the stability of the pulse is as important as the reduction itself; that is, when it does not fluctuate with exertion or excitement. I have found that an increase in weight occurred in at least one-half to three-fourths of the cases after the first series of roentgen treatments. As soon as the pulse rate is reduced and becomes more or less stable and the patient increases in weight, the nervous symptoms, such as excitability, insomnia, etc., improve rapidly. The exophthalmos improved in many of the cases which I treated. Some authorities state that improvement is noted in fifty per cent. of such cases. In my cases there was a reduction of the thyroid gland, at least to a certain extent, in over two-thirds of the cases of the exophthalmic type, and in about one-half of the cases the reduction was very marked. As before stated, we must go cautiously and when the hyper-secretion is reduced to normal, we must stop treatment, regardless of the size of the thyroid, because if carried further there is a danger of producing myxedema.

There is a class of cases in which the value of roentgen therapy is too little appreciated even by men practiced in its use, which includes the small or moderate sized goitre of adolescent females with few or no symptoms. Hitherto the best advice we could give these cases was to let their goitres alone. Medical treatments offered them

a problematical result and, since the cosmetic consideration was of chief concern, a surgical operation, with its resulting scar, was considered with reluctance. Moreover, the majority of these goitres disappear spontaneously in a few years or in a few months. It is true we are unable to say which cases belonged to the majority that would be cured by nature's own method or which ones would go on to a life-time of chronic hyperthyroidism, and the conversion of glandular into cystic tissue, with its resulting permanent unsightly tumor which is always a potential danger by reason of mechanical pressure. In several such cases I undertook roentgen treatment, somewhat reluctantly, merely to secure a cosmetic effect. I was amazed to find that the treatment resulted not only in a distinct gain of weight and bodily strength, but also in the correction of a psychic instability which had been looked on as a matter of character rather than disease.

When it becomes the custom to regulate by judicious roentgenization, even minor abbreviations of thyroid function appearing at adolescence, I believe we will not only prevent the chronic hyperthyroids and disfiguring cystic goitres of later life, but also add appreciably to the health and welfare of the community.

The treatment of goitre is major roentgenological work and should not be attempted by anyone unless he is familiar with his technic and knows the physiology and pathology and needs of a clinical study of the ductless glands. A decrease in the pulse rate and an increase in weight are the first improvements noted. Reduction of the thyroid is not always marked when all the symptoms have disappeared and the exophthalmos is the last to show improvement. Sufficient results have been produced to give all cases a fair trial because nothing is lost thereby and many operations will be avoided. If the patient is greatly relieved after the first series of treatments, you must not consider the patient cured at this stage. It is to be expected, if it is necessary to operate, the mortality will be lessened by preliminary roentgen treatment. The aim is to produce sufficient atrophy of the thyroid, so that it will produce a healthy amount of secretion and no more.

OTHER GLANDULAR TUMORS

Multiple glandular tumors, including tubercular, sarcoma, Hodgkin's disease, lymphatic leukemia, primary carcinoma and syphilis, are at times difficult or impossible to diagnose clinically. A series of successfully treated tubercular adenitis cases will undoubtedly in-

clude a small percentage of cases which were not tubercular. It is impossible to make an exact classification clinically, and even at times, pathologically. It is rather striking how similar are the results in the treatment of many of these conditions, even if the glands have been excised and a pathological examination made.

While the roentgen rays are indicated in all of the glandular diseases mentioned, with the exception of syphilis, my experience has been that Hodgkin's disease responds quicker to the roentgen rays, and also is more likely to recur than any other disease mentioned. A large tuberculous mass of glands will not respond to the same amount of treatment as Hodgkin's disease or sarcoma, but after they are clinically cured, the result is more permanent. In Hodgkin's disease, the enlargement can be made to disappear entirely, but usually within a short time after the treatment there may be a recurrence, and it is necessary to keep raying the patient at frequent intervals to keep down the enlargement. In this disease a patient, emaciated and bedridden may, by the treatment, not only show a temporary disappearance of the glands, but may even resume his occupation for a time. As soon as any recurrence is noticed, treatment should be administered and, as a rule, the external tumors can be controlled for a long time or until the patient succumbs to deep involvement.

Lympho-sarcoma in which the disease disappears under roentgen treatment is usually slower to recur in comparison to Hodgkin's disease. However, the results do not compare with those in the cases diagnosed as tuberculous glands, but I have patients apparently well for three years in whom a gland had been removed and a pathological diagnosis of lympho-sarcoma made. One case lived seven years where the diagnosis had been made at the Mayo clinic and operation was refused.

In most cases of both lympho-sarcoma and Hodgkin's disease, the glands can be made to disappear under proper treatment and do not recur nearly so quickly as when they are removed surgically.

In tubercular adenitis the severity of the process ranges from large broken down glands and large glands not broken down to glands almost invisible. The rapidity of results is most striking in the large broken down glands and it is particularly interesting to note that most of these cases were just as permanently benefited as in the cases where the glands were only of small size. In comparison to the size of the glands it requires less treatment to reduce the mass, when the glands are large and broken down, or about to

break down. Strange as this may seem, it is true, but we are unable to account for this, unless it is due to the fact that there is so much more glandular tissue present in the large tumor which is more easily affected by the roentgen rays. Most likely, there is a constitutional effect, and this is most pronounced when a large amount of tuberculous tissue is rayed, as well as the fact that the tissue is of lower vitality than in the smaller glands. These facts suggest that, in the destruction of tissue, an autogenous vaccine is set free.

Ten or twelve years ago tubercular adenitis was referred on account of the treatment leaving no unsightly scar, but to-day the chief reason is that there are fewer recurrences and less danger of a general tuberculosis, also a larger number of cases are permanently cured. The diseased glands are of much wider distribution than the clinical signs indicate, and local lesions are often of such a character or so situated that they are difficult or even impossible to reach by any other method than roentgen therapy.

It is claimed that at least ninety per cent. of these cases can be permanently cured by radiation. There are many roentgenologists who have treated 300 or 400 cases successfully, covering sufficient length of time to justify us in advising radiotherapy as a routine method of treatment. At present this is admitted, even among many of the most conservative physicians. Reliable observers notice great differences in the percentage of successes and of failures. The reason for these clinical differences can be pointed out when we study the different methods of treatment.

The insertion of a tube of radium in a tubercular sinus will often heal it promptly and save removal. I have done this in a few cases and when the reaction disappeared the sinus was nearly healed. I believe this would be a dangerous procedure unless the entire chain of glands had first been rayed and the tuberculosis in the glands nearly all destroyed.

Tubercular adenitis is treated somewhat differently from malignancy, the same as quinine or the iodides are used in different diseases. It has often been noted that tuberculous glands in children whose tonsils were enlarged, were improved after radiation to such an extent that it was not necessary to remove them. Many do not advise the removal of diseased tonsils in children with tubercular adenitis, and some surgeons even claim that such a procedure aggravates a tuberculous adenitis. Many surgeons do not advise complete extirpation of the involved glands when they are

not well localized because they are afraid of setting up a general tuberculosis. This is mentioned by Dr. DeCosta, Attridge and others.

In writing of the surgical treatment of tuberculous adenitis, Mathews, in Johnson's "Surgery," states: "There is a widespread notion that surgical treatment is inefficient, that glands recur even at the site of a previous operation, so that when operation is recommended it is to be looked upon as but the beginning of a series of operations."

Von Mutschenvacker offers conservative treatment of tuberculous adenitis, and states that he has operated in only nine per cent. of 1344 cases. He recommends the roentgen rays and compares roentgen therapy favorably with surgery. He believes that the rays cause a disappearance of the adenoid tissue, leaving only the stroma.

LEUKEMIA

A large number of cases of leukemia have been treated, and while radiotherapy offers more than any other method, the end results are usually unfavorable. At first roentgen treatment appears to be favorable, and often a symptomatic or clinical cure is obtained. The fact still remains that radiotherapy is the most successful therapeutic agent yet discovered, but the first results are but temporary, and the treatment invariably fails to prevent the usual fatal termination.

It is remarkable how the spleen and lymphatic glands, as well as the blood count will improve after a few roentgen treatments are given. Many clinical cures are obtained, lasting from a few months to seven or eight years, but still we must always give a guarded prognosis in leukemia, because we can never tell when a relapse will take place. On this account we must regard the treatment as merely a palliative measure. This is no reason for us not following up the treatment as thoroughly as possible.

In the past many have only partially treated their cases, in that they were not kept under careful observation, and roentgenization was not given from time to time as is advocated. On account of the bone marrow, spleen and glands being effected by the disease, it can be readily seen how extensive the treatment must be since it has the malignant tendency to recur; the treatment should be repeated, of course within the bounds of safety. The most successful cases are usually those in which the treatment is carried out the most thoroughly. One of the most striking cases which I have

treated was bedfast when treatment was begun. After a short time she was up tending to her usual duties, continuing treatment at intervals. She was apparently well for four years, but during the next two years she did not show the same marked effect from the roentgen rays. Possibly more will be obtained in the future when more roentgenologists make a careful study of this subject. Pancoast, at one of the recent meetings of the American Roentgen Ray Society, criticized the members because so few of them had paid sufficient attention to this very important subject.

Drug therapy, except arsenic which occasionally exercises inhibition or possibly a curative effect, is valueless. Benzol has produced a few temporary results, but when they are carefully compared in a large number of cases with the roentgen rays, the later are not only superior, but are more lasting.

Permit me to quote a paragraph from Pancoast who has worked on leukemia in conjunction with Stengel for a number of years. They have carefully tabulated and studied their cases, and state their conclusions as follows:

"We are still obliged to regard leukemia as ultimately an incurable disease and to be satisfied with a prognosis which implies a prolongation of life from a few months to six or eight years, during a period of comparative comfort, partly taken up, however, by intervals of treatment for threatened or active relapses. The evidences of cure and experience are to be found in the extent of prolongation of life, the comfort and strength of the patient and ability to attend to business or work, and the freedom of a period of observation from frank relapses. Successful results require care in the preliminary treatment of the active period of the disease, persistence in treatment until every manifestation has disappeared, a careful watch over the patient thereafter, and a resumption of applications on the appearance of the first evidences of a relapse. The first indications of a relapse are changes in the differential count or a slight rise in the leucocyte count, or both."

Remission in leukemia following radium treatment has taken place in cases which did not respond to the roentgen rays. Whether radium is superior to the roentgen rays is difficult to determine, as a difference in technic may have been the reason for the different results in the cases reported. It would appear that the roentgen rays should be applied to the skeleton, as it is generally conceded that the primary lesion starts in the marrow of the bones, even if radium is superior when treating the spleen or lymphatic glands.

Remissions in leukemia have taken place following injections of thorium. In certain cases, it may be advisable to use radium over the spleen or glands and treat the entire skeleton with the roentgen rays. Giffin, from the department of medicine, Mayo Clinic, reported thirty consecutive cases of myelocytic leukemia treated by radium, using surface application as described by Ordway. They were all treated between May 1916 and April 1917, but the time is too short to consider anything except the temporary effects. He concludes as follows:

"Surface exposures of radium over the spleen of myelocytic leukemia usually effect a very rapid reduction of the size of the spleen, a fall of the leukocyte count, improvement in the general condition and, together with transfusion, constitute at present the most effective temporary measure in the treatment of the disease."

I shall not attempt to discuss the excellent work which has been done in fibroids of the uterus, where Koenig and Gauss report almost 100 per cent. of cures. Carcinoma and other diseases will be omitted, as each would be papers in themselves.

DR. E. H. BARTLEY: I noted that Dr. Johnston made the remark that he had never come across a case of primary carcinoma of the lungs. I would like to mention in the connection that two years ago I came across a case, which, in spite of all investigations for a primary focus elsewhere, appeared to be a primary carcinoma originating in the bronchial gland. A thorough examination was made at autopsy and no other point of involvement was discovered. I am not able to say whether this is a very rare instance, but it seems worth while to mention it in connection with this paper which Dr. Johnston has presented.

In regard to the question of the use of the x-ray in the diagnosis of pneumonia, Dr. Johnston has mentioned central involvement. I have been for a number of years chiefly interested in cases of pneumonia occurring in children. In this type the disease certainly does begin at the periphery and it extends toward the hilus; although I am not prepared to say that it does the same thing in adults. In children the physical signs occur only when the disease reaches the bronchi. There is no such thing as central pneumonia in young subjects. The x-ray shows that the disease begins at the pleurae and extends inward. I don't know why, in these so-called central pneumonias, that there appear evidences of delirium and toxemic conditions. Often these cases die without a definite diag-

nosis having been made. They are supposed to be central pneumonias. The x-ray should be of service in determining pneumonia when physical signs are absent.

In the forenoon of December 28, 1917, clinics were held at the Mercy Hospital, Pittsburgh, during which many interesting patients were presented by the medical staff of that institution, and the cases discussed by the members of the congress.

COMMUNICABLE DISEASES AMONG THE SOLDIERS IN ENGLAND AND FRANCE

By W. H. PARKS

In Europe, as in America, we find that great bodies of men are collected in companies for training. Those who come from cities have, as a rule, had the ordinary communicable diseases, such as measles, whooping cough, mumps, and have been exposed to the others, such as diphtheria and scarlet fever. Many, however, come from small hamlets or towns in which one or more of these diseases has not been prevalent for years. When such men mingle together, there is great opportunity of infection if the chance offers and we find, in the training camps abroad as in the states, that measles, mumps and, to a less extent, scarlet fever, whooping cough and chickenpox prevail. When these men have passed the period of training and are ready to go into active service, they have, as a rule, been protected by having had these diseases either before entering camp or afterward, and there is comparatively little of such infections at the front. Nevertheless, here and there small outbreaks do occur which interfere considerably with the active service of the troops. The diseases other than wound infections which are most important in France and England are pneumonia and other respiratory diseases, meningitis, diphtheria, dysentery and, in the more southern climates, malaria. The troops in France have, fortunately, been protected from exposure to typhus fever and cholera and by vaccination from typhoid fever.

The amount of tuberculosis among the troops at camp and the troops at the front is disputed. In England, there is no increase in the camps and there is certainly no great development of tuberculosis among the troops at the front. Among the French, it is very difficult to decide on account of the lack of informatoin as to

the amount of tuberculosis among the civil population of France and the fact that the men were called so suddenly to withstand the German attack, that no proper physical examination could be made of the troops. Examinations at the front have apparently revealed a good deal of incipient tuberculosis and some advanced tuberculosis. Many of those sent home as incipient cases have after very careful examinations made at the receiving hospitals been discharged as not having the infection. Trench fever has been more interesting than important.

Two diseases were prominent at the beginning of the war on account of the infection of wounds through the dirt. These two, tetanus and gas gangrene are, of course, not communicable under ordinary conditions from person to person. The surgical care of wounds has largely eliminated gas gangrene, and the use of antitoxin, the development of tetanus.

There was at first a great deal of typhoid fever and probably also of paratyphoid fever. Happily vaccination has largely reduced these infections.

Malaria was of little importance. What did occur was mostly relapses among those who had received their infections in Turkey and Greece. In those countries malaria was frequent and severe. The diseases which were being combatted with newer methods were meningitis, pneumonia, typhoid fever, paratyphoid fever, dysentery and tetanus. The time at my disposal will be taken up in their consideration.

CEREBROSPINAL MENINGITIS

Its Prevention and Treatment. This disease has been quite prevalent among the troops in the training camps in England and Canada and somewhat so among the English and French troops in France and the Australian and New Zealand troops in home camps and on the transports.

Among the English troops alone, there were some 3000 cases during 1915. The disease was somewhat less prevalent in 1916 but was again serious in 1917. The civil population was only slightly affected. Each year the greatest number of cases occurred in February, March and April. The seriousness of the outbreak developing in England in 1915 caused a very thorough investigation of the means of spread of the disease and the best methods of prevention and cure. The outcome of the investigation has been made public by the British Medical Research Committee and by

reports from individual workers such as Gordon, Eastwood, Tullock, Griffith and Scott.

The information obtained corroborated the statements made by Bolduan and Goodwin of the New York City Bacteriological Laboratories in 1906 as to carriers and those of the Rockefeller Institute and the Health Department Laboratory as to the value of serum and the different strains of meningococci. The work of the English Research Commission has, however, taken up much more thoroughly and probably successfully the treatment of carriers by the use of antiseptic sprays.

The general results of the English investigations are as follows:

Factors influencing the incidence of the disease. Whenever cases developed among the troops bacterial examination of contact persons revealed that there were many carriers for each case. As in pneumonia, diphtheria, infantile paralysis and many other diseases, so it is in cerebrospinal meningitis that only a few of those who receive the infecting organism and in whom it gains a foothold in the mucous membranes become truly invaded and ill. Those persons who become carriers seem to be in almost no danger of contracting the disease. The fact that a person carries the meningococcus in his nasopharynx for a number of days without deeper infection, almost proves immunity.

The abundance of carriers and of cases depends chiefly on the virulence of the organism, the susceptibility of the population and the atmospheric conditions. The season of the year is of the utmost importance. The importance of the susceptibility of a population which has not been subject to infection was clearly brought out by the recent epidemic among the blacks in British South Africa where the proportion attacked was much greater than ever occurs among the white troops.

The carrier rate has been found to vary in different localities and at different seasons of the year. This has been true in both England and France. In parts of England where the disease is endemic but not epidemic about two per cent. of the tested cases has been the average amount infected. In some special classes of persons, such as hospital out-patients, the amount has approached five per cent.

In the recruits entering the British Army the percentage of carriers has been higher during the past winter than during the two previous ones. This rise took place in December and in one garrison at the beginning of February fifty per cent. were found to be

carriers. With this increase in the number infected, an outbreak of cases occurred. The Research Committee conclude that when the carrier rate is low, the case rate is usually moderate. A rise in the carrier rate is soon followed by an increase in the cases. This is probably partly due to an increase in the virulence of the meningococci.

Seasons. The influence of seasons has been already referred to.

The cases increased among the troops in England during January and February and subsided in April. The same general rise and fall in cases has been noted in influenza, measles and mumps. There was not noted any tendency for persons having these diseases to suffer in any excess proportion to meningitis but the increased coughing might have had an effect in spreading meningococcic infection from carriers to non-infected persons.

The cold weather, besides affecting the mucous membranes, also tends to bring the troops in closer contact in poorly ventilated rooms and in parts of the rooms not well heated to allow a longer life of the meningococci expelled into the air in the act of coughing and talking.

The Virulence and Types of the Meningococci. This attribute, except in so far as indicated by the severity of the cases, is very hard to measure as no animal develops the disease naturally or typically. The considerable immunity of most populations to the common types adds a difficulty.

In England there were found to be in about ninety-seven per cent. of the cases, but four strains of meningococci. These, like the pneumococci, differed from each other in their immunological attributes. The strain designated as number 2 was found to be distinctly less in virulence for animals than the others, but strains in each type differed among themselves. The great majority of the cases in England and France were due to the strains which were designated as 1 and 2. Observations in this country agree pretty closely with those in England.

Means for Checking the Spread. 1. The general conditions so far as sufficient floor space and ventilation should be made good.

2. Prophylactic inoculations of killed cultures. Abroad in both England and France, these have been given to only a small number of persons. Sophian of our own laboratories gave the inoculation to several hundred persons in the Texas epidemic of 1912 with certainly no bad results. We have recently inoculated several thousands of men in our home camps. These inoculations should

be thoroughly tested out. The doses should be of at least the same amount as in typhoid inoculations. We have used for the three doses, one, two and three billions. The reactions have not been severe.

A serious difficulty is that the different strains as in the case of pneumococci do not immunize efficiently against each other and that type one, in rabbits at least, does not produce definite immunity against even itself. The experimental injections should be made partly with single types and partly with an equal mixture of all types so that the completeness of protection given, in each case, could be determined.

3. Identification and isolation of carriers.

The English and French have both tried to separate the carriers from the uninfected troops and the results have been considered good.

The English have used these methods of handling the carriers.

A. Where cerebrospinal meningitis has occurred frequently, all the men in the unit or camp have been swabbed and the positive cases removed. The general experience has been that when this was done, the outbreak has stopped. The procedure requires a very considerable laboratory force. Two trained laboratory men and two trained assistants, if pushed, can, for a limited time, do 100 cases a day. All media, agglutinating sera and cleaning are supplied from a central laboratory.

B. Swabbing of only those who have been in contact with the cases. This is the method generally adopted by both the French and English authorities for the troops, both in the training camps and at the front.

The English consider, as a possible contact, everyone coming within two yards of the diseased person for an appreciable time. If the general carrier rate is low in a camp, this procedure will probably be quite effective, but if high, much less so. It has been found that a wise course is to swab a considerable number of non-contacts from the same unit or camp and so judge the general proportion of carriers among non-contacts as contrasted with contacts.

It has been found that when repeated tests of "non-contacts" are carried out that an increase in carriers will be noticed in some instances before any cases occur. By this means, an outbreak may be forecasted and prevented.

C. The isolation and examination of both those in contact with

the cases and those in contact with positive contacts. The immediate contacts are tested and those proving positive are considered as foci to those who have been in contact with them. This method is continued until no more carriers are discovered.

This method was carried out by the French in a large training depot. The conclusion was that this method, while it did not wholly stop all further cases, yet it did lessen greatly the number.

The Research Committee believe that, if in summer, a general attempt to find the few chronic carriers could be made, that the winter spread of the infection might be wholly or largely stopped. This would mean a great deal of work from the bacteriological squad—not only the culture must be made properly, but the culture must be examined by trained observers.

Disinfection of Carriers. The difficulty of separating and isolating carriers suggested attempts to free cases from infection by douches, sprays and vapors. The majority of carriers soon free themselves, but a considerable proportion remain infected for weeks or months. A considerable proportion of these have pathological anatomical conditions, such as enlarged tonsils and adenoids, which are believed to favor the persistence of infection.

The longest duration of infection met with was 15 months.

Several different antiseptic solutions were used to make the spray. The two which seemed the most effective were chloramine-T in a one to two per cent. solution and zinc sulphate in a one per cent. solution.

The spray was made by driving a steam jet across the tube connecting with the solution. It was found necessary to fill the chambers with a dense cloud of very minute droplets as it was shown that it was the droplets themselves and not any gases in the air which produced the effect. One litre of solution per hour in a room containing 1000 cubic feet gave about the right density. The carrier remained in the room for ten to twenty minutes and inhaled vigorously through the nostrils.

Chronic carriers at least were made to cleanse the nasal cavity with salt solution before entering the chamber. An antiseptic gargle such as a one per cent. chloramine-T or one per cent. permanganate of potash was considered of advantage.

The effect of the chloramine-T treatment is to produce an immediate increase in the flow of secretion from the nasopharyngeal mucosa. In some cases, the mucus which, before the treatment,

contained numerous living meningococci was found to be free on leaving the chamber.

In the largest trial camp, 5,000 men were subjected daily to the spray treatment. In these cases the one per cent. zinc sulphate was used because it is less irritating than the chloramine.

The New Zealand and the Australian authorities used the spray to free "carriers" going to England on the transports. The treatment seemed not only to free carriers but to lessen the incidence of mumps, measles and colds. It seemed to diminish the chance of infections which take place through the mucous membranes of the nasal cavities, mouth and pharynx. Fildes at the British Naval Station at Portsmouth, after a very extensive test, came to the conclusion that no solution had much preference over another and that the effect produced was not very great.

The French have not used the fine spray inhalation treatment. The meningitis problem has been far less important in their army and the rigorous use of cultures to separate the carriers has been sufficient. They believe swabbing the nasopharynx with carbolized oil is of advantage.

Dopter has tried the use of insufflations of dried antimeningitis serum and thinks they may prove of value.

While it seems to me impossible that the serum would be efficacious, it is worth investigating as it is easy of application and perfectly harmless.

It is apparent that while much has been done to lessen the spread of meningitis the results are only partially satisfactory and further investigations are necessary.

Treatment. The English and French authorities, like ourselves, consider serum treatment is of great value. An important point has been brought out that any serum, to be efficient, must be potent against the types of meningococci occurring in the cases under treatment. During the first year of the war, much of the serum used was of little strength and unequal in its potency for the different types. The results with this serum were very disappointing.

The Rockefeller Institute and the New York City Health Department have always made certain that the horses were treated with balanced cultures of the different types of meningococci and that every lot of serum was tested for its potency.

The United States Public Health Service has just ruled that no serum should be sent out from American producers until the Government has assured itself of the serum's potency.

Cultures from a number of the European cases have been brought over to make sure that those obtained by us at an earlier time fully cover the present strains.

Immunization against Typhoid Fever. The greatest accomplishment in the prevention of disease during the war is unquestionably the limitation of typhoid and paratyphoid fevers through vaccination. The military and civil authorities in all countries are in accord as to this.

The results in the French Army are most striking.

At the beginning of the war, less than half of the troops had been vaccinated against typhoid fever and none against paratyphoid fever. During the winter and spring of 1915 typhoid vaccination was pushed, but it was only in the fall that the paratyphoid vaccines were commenced.

The typhoid and paratyphoid developments were as follows:

During the fall of 1914 and the early winter of 1915, there were many days in which 500 to 700 cases developed and several thousand deaths occurred each month. With improved conditions and the general use of typhoid vaccines, the incidence gradually improved so that less than 100 were reported. With the hot weather the cases increased somewhat, so that for a few days, as many as 500 occurred, but bacterial examinations revealed that there were mostly paratyphoid fever. Before the summer of 1916, the troops had all been vaccinated against both the typhoid and paratyphoid A and B bacilli. The sanitary conditions were also better. The combined result of the vaccination and the better care was that, at the worst periods, less than one per cent. of the cases developed as compared to 1914 and less than ten per cent. of the summer of 1915. The 1917 results were even better.

The English from the start vaccinated all their troops against typhoid fever and after the first year against the paratyphoid fevers. The sanitation has always been good. The combined effect has been to make typhoid and paratyphoid fever cases very infrequent.

Dysentery: The bacillary and amebic types of dysentery have been moderately prevalent in both the French and English armies.

The amebic infection of the English troops in France occurred from men transferred from Turkey, and of the French troops through the addition of men from North Africa.

The amebic form occurred during all seasons of the year, while the bacillary form occurred only in hot weather. At some portion of the front the Shiga infection was most important, at others, due

to the other strains. A number of persons suffered simultaneously from both infections.

Prevention. There is no specific treatment to prevent infection in dysentery. The ordinary precautions used against intestinal infections are employed as thoroughly as possible. The vaccines so far prepared from the various strains of dysentery bacilli have been too toxic to be much employed. The use of specific serum and bacillus mixture—sensitized vaccine—is still in experimental stage.

There have been no vaccines developed which are effective in developing immunity against infections due to the ameba.

Treatment by Serum of Bacillary Infection. The polyvalent serum from horses which have been injected with various types of bacilli is used in the treatment of severe cases in doses of forty to 100 c. c. It is as a rule administered subcutaneously every twelve or twenty-four hours for usually three or four times. The earlier it is given the better. When one type of bacilli is found to be the sole cause of the local epidemic, a serum especially potent for this type is employed if it is possible to obtain it.

B. Amebic Infection. Treatment of Carriers. The usual treatment with emetine hydrochloride was found to fail, in more than half of the cases, to rid them of the infection. Lately, emetin bismuth iodide has been substituted by the English with better results. The drug is given by the mouth in doses of three to four grains for each of twelve consecutive days. In order to prevent nausea and vomiting, the emetin may be given in pills coated so as to pass the stomach unaltered. Diarrhea and vomiting are thus less apt to occur. Jepps and Meakens report ten out of eleven cases were cured after twelve daily doses.

Pneumonia. Lobar and broncho-pneumonia due to exposure or as complication of measles and other infections are common both in the camps and in the fighting area. Lobar pneumonia had been epidemic among the Singalese in their camps in Southern France.

Borrel showed me the clinical results of the treatment of many of the cases with serum. In many cases, the temperature fell shortly after its use. The dose was fifty to 100 c. c. and usually repeated once or twice. It was given subcutaneously. He had also vaccinated all the men in two large camps. In one camp, the cases became milder and less frequent about ten days after the second inoculation. In the other camp, the course of the epidemic was unchanged. The strain of pneumococci used came from a case in the first camp and it is possible that the type of pneumococci in

the second camp are different. The results in South Africa are certainly very encouraging and I certainly feel that we should test out the value in our camps so that we may soon have additional knowledge.

Tetanus. During the early period of the war considerable tetanus appeared among English wounded and still more among the French. Injections of 500 units were first made compulsory in all infected wounds and then in all wounds. The dose of 500 units was repeated at the end of several days in all infected cases and again when thought necessary.

Less than one in 1000 now develop tetanus in the English and French Armies, and these rare cases are usually those who received no antitoxin. The serum in the developed cases in France is mostly given subcutaneously or intravenously because of fear of anaphylactic shock if given intraspinally in cases who had previously had an immunizing dose of antitoxin. The British advocate the intraspinal method.

Trench Fever. This is a form of relapsing fever occurring especially among the English troops in Flanders. The fever is accompanied by headache and pains in the lower limbs. The blood contains infectious organisms which do not pass the stone filter. Microscopical examination reveals no microorganisms. It may be conveyed by insects.

SOME PROBLEMS OF CARDIOVASCULAR DISEASE

By EDWARD E. CORNWALL

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The central pump and its tubal connections, including the kidney filters, may be subjected to extraordinary wear and tear, and the pathological and functional manifestations of this wear and tear, though variously distributed in locality and time, may be brought into one focus and looked at as a whole; and this whole we call cardiovascular disease. The essential unity of cardiovascular disease is found in the etiology and interrelationships of its different manifestations; and these make it possible to consider it as a clinical entity and to treat it as such. It is not synonymous with arteriosclerosis, or chronic nephritis, or chronic myocarditis, although

those are the three principal pathological foci around which its manifestations cluster, so to speak.

Of the many problems presented by this disease, only two will be discussed here, viz., its prophylaxis and the treatment of the high blood pressure which is often found associated with it.

The prophylaxis of cardiovascular disease is one of the large things in preventive medicine, and one which deserves more attention than it has generally received. This disease occupies relatively as large a place in the morbidity of the latter half of life as do diseases of bacterial origin in the first half. Its prevention or postponement means much in prolongation of life and usefulness and well as saving of misery. The loss to the world from the shortening of the period of useful human activity caused by the premature development of this widespread disease is difficult to estimate, but it looms large enough to make its prophylaxis a medical thing of the first magnitude.

This prophylaxis must take into account the etiological factors. Among those factors heredity stands out prominently. The quality of the material of which the cardiovascular apparatus is made differs widely in different individuals, and this quality is inheritable. One may inherit such an apparatus of poor material just as he may inherit a constitution subnormally resistant to tuberculosis. Heredity also admits other things which bear on cardiovascular disease, particularly conditions of metabolic insufficiency, which make for excessive irritation and early degeneration of the tissues of the cardiovascular apparatus, as well as increased demands on the eliminative functions. Similar tastes and tendencies, occupations and environments, moreover, are apt to be present in successive generations and to increase the effect of heredity. A tendency to cardiovascular disease can always be suspected when the patient shows a family history of apoplexy, nephritis, diabetes, obesity, gout, migraine, chronic arthritis or heart disease. It is a matter of strong probability that persons with such a heredity, when they come to middle life, will begin to wear out as to their heart, arteries or kidneys, if they live as their forbears did, or even if they live in the conventional way. This probability is increased if they early exhibit signs of symptoms which suggest metabolic insufficiency, such as obesity or periodical headaches. The so-called "sick headaches," occurring periodically, are particularly suggestive of nitrogenous metabolic insufficiency, and all that implies. These people if they would escape their bad inheritance must adopt a mode of

living which will protect them as far as possible from the action of the other causative factors of cardiovascular disease.

Excessive work, physical and mental, is an important factor in the production of this disease, and a factor which usually can be controlled. Acute cardiac overstrain may leave the heart permanently damaged or predisposed to degenerative changes; and long continued physical overstrain may produce cardiac hypertrophy, arterial hyperplasia and a predisposition to early degeneration of the circulatory apparatus. Prolonged mental work, the burden of heavy responsibilities, and worry long continued may do the same thing as also may excessive indulgence in social dissipations, late hours and excitement. If physical, mental or emotional overstrain compel the circulatory apparatus for long periods to maintain an average endarterial pressure considerably higher than it is accustomed to, it is easy to understand how permanent damage to that apparatus can result.

A factor of great, of not paramount importance in the etiology of cardiovascular disease, and one which is to a considerable extent under control, is the excessive, or relatively excessive burden which is laid on the circulatory apparatus by the metabolism connected with the processes of nutrition. The work of transforming material from the outside world into the living tissue of the body and available fuel, and getting rid of the deleterious by-products formed in the preparation for utilization of the food material, rests to a large extent on this apparatus. Also, its structures are subjected in the meanwhile to the irritating and disintegrating action of the toxic by-products of an extensive chemical activity.

The specific poisons of the infectious diseases also may be causative factors in the production of cardiovascular disease. Syphilis, rheumatic fever and typhoid fever deserve special mention in this connection.

Besides the toxemic strain of an unfit diet or a bacterial infection, a related element in the causation of cardiovascular disease, and one which usually can be controlled, it would seem, is chronic poisoning by alcohol, tobacco, coffee and lead. These poisons may disturb digestive operations, thereby favoring the production of intestinal toxins; or the liver, thereby weakening the strongest defense of the body against poisons; or organic functions which directly or indirectly affect the circulatory apparatus; and it is possible that they may themselves directly irritate or injure the cardiovascular tissues.

In the prophylaxis of cardiovascular disease the easy life and the easy diet are of the first importance, and they are particularly necessary for those whose heredity marks them out as probable victims of the disease. The easy life needs no special explanation, but it may not be amiss to say a few words in explanation of the easy diet.

The progress of civilization has changed man's ways of life, in many particulars, more rapidly than his organism could make the necessary adjustments; and especially severe has been the strain of these adjustments on the large part of the population which in one or two generations has made the change from the more natural country life to the more sedentary and exciting city life. Along with the notable increase in the proportion of our population living in cities has been observed a great increase in the mortality from cardiovascular disease. The conventional diet, which has been developed not only to meet the nutritional needs of the body, but also to gratify cultivated and artificial tastes, and which is largely a habit, remains now practically what it was in the prescientific period; and it has no regard for the easement of the strain of these adjustments, but continues to impose an unnecessary metabolic burden; even if quantitatively correct, it is qualitatively wrong in that it admits regularly an unnecessary amount of toxic waste which the organism has to get rid of. The easy diet is regulated with the object in view of reducing to a practical minimum, that is a minimum consistent with nutrition and comfort, the amount of work which the organism has to do in feeding itself and fuelling itself, and clearing off the table and cleaning out the furnace. The easy diet should be regulated quantitatively, so as to limit the amount of the various food elements ingested to the reasonable needs of the body, avoiding on the one hand luxus consumption, and on the other, undue encroachment on the margin of nutritional safety; and it should also be regulated qualitatively.

Qualitative regulation of the diet takes into account the composition and qualities of various articles of food, with special reference to their reaction on the human physiology after ingestion. Different articles of food may have the same proportions of the various food elements, they may have the same amounts and kinds of protein and the same fuel value, and from the point of view of quantitative dietetics be equivalent; while from the point of view of what happens to them and in consequence of them in the body they may be far from equivalent. Boiled spinach and boiled cab-

bage may analyse about the same, but from the point of view of the easy diet they show differences. Dextrose and saccharose may supply the same number of calories, weight for weight, but from the point of view of qualitative dietetics they have not the same physiological value. An ounce of lean beef and an ounce of cottage cheese contain about the same amount of protein, with the same kinds and proportions of amino acids, and about the same fuel value; but they are by no means of equal value in a prescription for an easy diet.

Perhaps the most important thing in the matter of the easy diet is the selection of the protein containing articles, for the burdensome and poisonous substances which are produced as by-products in the preparation for utilization of protein in the body stand out prominently in the etiology of cardiovascular disease; and the amount of these poisons produced varies much in the case of different articles. How shall we make the selection?

The answer is found to a large extent in the fact that most of these toxic protein fragments are broken off from the protein molecule and its derivatives by certain classes of bacteria which are regularly present in the alimentary canal; and the further fact that the activity of these bacteria is largely dependant on the chemical reaction of the media in which they live; they are particularly active in an alkaline medium, and not so in an acid one. These facts suggest that the protein containing articles of food which easily or regularly become acid or stay so long are the best protected from the action of the protein-poison-splitting bacteria, and are therefore the best suited to supply protein in the easy diet.

The practical application is not difficult, for it is a matter of common observation that some protein containing articles of food easily turn sour because of their susceptibility to the action of harmless acid forming bacteria, and that some do not. Milk, bread and cereals turn sour when they spoil, but animal flesh and eggs putrefy when they spoil. In fact, it is possible to divide practically all the articles of food containing protein into two great classes, according as they turn sour or putrefy when they spoil, and the dividing line runs very strictly between the animal and vegetable kingdoms until we come to milk, which is an animal food, but does not putrefy but regularly sours when it spoils. This is a fact of great importance in the matter of the easy diet, because milk is an article rich in protein, and animal protein, and protein which contains all the amino acids needed by the body and in approxintaeely the propor-

tions which the body can utilize. It also happens, as a nearly universal rule, that the class of protein containing articles which sour when they spoil contain little or no free split proteins of the undesirable purin class, while the contrary is the case with animal flesh. The easy diet, then, considered from the point of view of its protein ration, should be largely if not altogether lactovegetarian. Yet it is possible to say a word in favor of a small proportion of animal flesh in the diet of the average case. The healthy body is so accustomed to battling with these putrefaction poisons that complete deprivation of them might result in weakening of a useful function. The principle of variety also enters into the question to a slight extent, and also the matter of regard for habitudes.

In this connection a word about vegetarianism may be in place, in order to make clear the fact that vegetarianism and the easy diet are in no way synonymous. A purely vegetarian diet is a hard one, because of the difficulty of getting from vegetable articles protein which contains the full quota of amino acids needed by the body, to say nothing of getting them in the ideal proportions which favor the nitrogenous economy of the body. Most of the vegetable proteins are "imperfect proteins," considered in relation to the body needs, and although it is theoretically possible to combine different imperfect proteins so as to make them supplement each other, there are practical difficulties in the way. The easy diet requires that a certain proportion of its protein be derived from animal sources, for the reason above suggested; and it is fortunate that of the three classes of animal foods, viz., flesh, eggs and milk, there is one, milk, which is particularly easy on every count; and this fact makes the easy diet essentially a lactovegetarian one, which is very different from a vegetarian one.

The second of the two problems connected with cardiovascular disease selected for discussion here is the treatment of high blood pressure. High blood pressure is often found associated with cardiovascular disease, and its treatment as a symptom sometimes comes into question. What should be our therapeutic attitude toward this symptom?

We can no longer accept symptomatic treatment as a universal dogma, because symptoms are not essentially diseases or parts of diseases which call for suppression or ablation. Nor are they always or necessarily manifestations of disease. On the other hand, they are often evidences of nature's counter operations to overcome disease, and are physiological rather than pathological processes.

Such seems to be fever, which, in general, may be taken as nature's constructive reaction against invading microorganisms or their toxins. Even more plainly high blood appears to be a conservative physiological procedure.

It may safely be assumed that whatever the circulatory apparatus does regularly is in the interests of an adequate circulation, and high blood pressure consequently appears as a manifestation of compensatory activity to meet some unusual circulatory requirement. It may signify that the organism is trying to maintain an adequate circulation in the presence of some obstruction, or some extra demand for elimination: the high pressure may be required for the benefit of a vital region whose blood supply is impeded by arteriosclerosis; or it may be required for the elimination of retained waste products whose elimination has been rendered more difficult by pathological changes in the kidneys. With this understanding of the significance of high blood pressure, viz., that it is physiological instead of pathological, and regularly useful rather than harmful, its direct treatment becomes restricted to the exceptional cases in which nature has lost her control over the situation and is overdoing her duty (in the presence, perhaps of an insuperable obstacle, such as a large blood clot pressing on the brain); as shown by elevation of the pressure to a point which threatens immediate injury to the circulatory apparatus itself. In such cases the use of direct means to lower the pressure, viz., the administration of arteriodilators, may be indicated temporarily. But in general, the only treatment of high blood pressure which is rational is that which is directed toward removing or improving the conditions which make it necessary; and the most important and by far the most effective part of this indirect treatment consists in the easy diet.

THE ROLE OF INFECTION IN THE PRODUCTION OF
ADDISONIAN "SO-CALLED PERNICIOUS" ANEMIA
AND A METHOD OF TREATMENT BASED
UPON SUCH CONSIDERATION

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Before attempt is made to suggest treatment for an ailment, it would appear quite essential first that the nature of the affection under consideration be understood and second, that any mode of

treatment advanced be directed toward the remedy of known malfunctions and the local or systemic damage consequent upon such. Types of therapy departing from these basic principles are largely empiric and usually ephemeral.

Since Combes' original though imperfect description of so-called pernicious or severe anemia in 1822 down to the present time, the nature of the disease has been obscure. Nevertheless, numerous systems of treatment have been advanced and have obtained a vogue. The chief virtue of many of these therapeutic régimes has been that the majority of them were harmless to the patient—in many instances the disease progressed in a sort of self-limited fashion to a fatal termination.

The unsatisfactory status of the treatment of so-called "pernicious" anemia may be ascribed chiefly to the facts that there has been great confusion in the medical mind as to what group of cases is to be made up of "pernicious" anemias and what type of case is to be excluded from the classification. Very likely the term "pernicious" taken in the sense of "fatal" is largely responsible for some of the existing confusion.

The adoption of this nomenclature has resulted in the more or less general conception that any anemia presenting the feature of chronicity, intermittent and of obscure origin should be classed as "pernicious." Moreover, if in a given case, morphologic study of the blood picture revealed the megaloblastic features emphasized by Ehrlich, it was presumed that the disease should be included in the "pernicious" group. A second and perhaps more important cause for confusion arose as a consequence of the carelessly grouped but widely circulated classification of the anemias by Biermer in 1871. Although in 1855, following a masterly study of a peculiar anemia, Addison had clearly defined an unusual disease syndrome, Biermer, either through lack of knowledge of Addison's contribution, or as a result of his failing to appreciate the essential features of Addison's anemia, suggested the term "progressive pernicious anemia" to cover various forms of anemia both ideopathic and symptomatic in virtue of their having common clinical features. Although Biermer's classification was strenuously disputed by Eichhorst and Immermann, it secured widespread recognition and, in fact, furnished the basis for Ehrlich's later morphologic classification of the severe anemias.

Before attempting to emphasize any mode of treatment of Addisonian anemia, it is quite necessary that the conception of the ail-

ment as described by Addison should be appreciated. It is frequently stated that any severe anemia provided it is not acutely fatal may result in the clinical and morphologic variations from the normal described by Addison; that is, that Addisonian anemia and Biermer's progressive pernicious anemia are interchangeable terms which describe an identical disease and that moreover, this disease is not a true clinical entity but represents a stage in the process of blood poverty from any obscure causes.

To anyone who has seriously compared the anemias clinically and pathologically, it becomes quite evident that the problem of classification is by no means simple. The terms "secondary anemia" (that is, due to known or visible causes) and "primary," "essential" or "pernicious" anemia (that is, anemia due to obscure causes and usually resistant to treatment), are not complete or exact. There is no sharp line separating the "secondary" from the "essential" anemia groups. Under this nomenclature: it is common clinical observation that not rarely one form merges into the other. To the persistent, acute and brilliant efforts of William Hunter, we are indebted for calling attention to and emphasizing a most vital and basic principle underlying the clinical, pathologic and haematologic features exhibited by the anemia described by Addison. Hunter's observations, it would seem definitely segregate Addisonian anemia from the great group of severest anemias previously named generically, primary, essential, ideopathic or pernicious. Based upon his classification I have grouped the anemias etiologically as follows:

THE SEVERE ANEMIAS

(1) *So-called "Secondary Anemias"*

Mild	}	Malnutrition
or		Hemorrhage
Severe		Post Infectious (acute)

(2) *So-called "Primary Anemias" Morphologically*

(a) Chronic Septic or Toxic. (Non-haemolytic)		L
Syphilis	}	Many Organisms
Tuberculosis		
Kala—Azar		
Trypanosomiasis		
Low grade Sepses		
Bothriocephalus		
Etc.		

Chlorosis	}	Many Toxins
Carcinoma		
Nephritis		
Cirrhosis		
Diabetes		
Lead		
Toluendiamine		
Disordered Endocrine Function		

(b) SPECIFIC, Chronic Septic with Constant or Intermittent
Haemolytic Features.

ADDISONIAN ANEMIA

"Progressive, Pernicious Anemia." A disease in which constant clinical and pathologic changes are associated with an anemia which may be mimicked by that of other forms of severe anemia.

After twenty-five years of patient endeavor, and work not generally directly appreciated, Hunter's views are in the main definitely substantiated by modern clinical investigation and the anemia of Addison segregated as a special form of anemia with a specific probably, group etiology. It would seem to be now possible to define Addisonian anemia as essentially a *haemolytic anemia*. It would seem that *further*, it is a specific, chronic anemia whose constant or intermittent haemolytic features are closely associated with *sepsis* or the consequences of such. *This septic agent is generally intermittently active, extends over comparatively long periods of time and is associated with organisms or agents of the haemolytic group.* Such organisms or toxins invade tissue, are widely disseminated in the body, but probably have a special affinity for lymphoid tissue and their toxins a special destructive action upon lymphoid tissue. Such organisms are described variously as "streptococcus longus" (Hunter), "streptococcus viridans," "lytic staphylococci" and bacilli stimulating those of the colon group. It is quite essential that these facts emphasized by William Hunter in his septic theory should be appreciated. It is likewise necessary that the evidences of hemolysis in Addisonian anemia by recent investigators be recognized. These observations are basic as aids to the segregation of the type of anemia under consideration.

CHARACTERISTICS OF THE DISEASE

A brief review of the essential clinical features of the ailment would appear to be opportune. The disease may be (a) chronic, or (b) acute.

(a) *Chronic Addisonian Anemia*. This form of the disease is most frequently encountered. Clinically, it is not possible to improve upon the classic description of the ailment presented by Thomas Addison in 1855. It is as follows: "For a long period I had from time to time met with a very remarkable form of general anemia occurring without any discoverable cause whatever—cases in which there had been no previous loss of blood, no exhausting diarrhea, no chlorosis, no purpura, no renal splenic miasmatic, glandular, strumous, or malignant disease. Accordingly, in speaking of this form in clinical lectures, I, perhaps with little propriety, applied to it the term "ideopathic," to distinguish it from cases in which there existed more or less evidence of some of the usual causes, or concomitants of, the anemic state.

The disease presented, in every instance, the same general character, pursued a similar course, and, with scarcely a single exception, was followed, after a variable period, by the same result.

It occurs in both sexes, generally, but not exclusively, beyond the middle period of life; and so far as I at present know, chiefly in persons of a somewhat large and bulky frame, and with a strongly marked tendency to the formation of fat.

It makes its approach in so slow and insidious a manner that the patient can hardly fix a date to his earliest feeling of that languor which is shortly to become extreme.

The countenance gets pale, the whites of the eyes become pearly, the general frame flabby rather than wasted; the pulse perhaps large, but remarkably soft and compressible, and occasionally with a slight jerk, especially under the slightest excitement. There is an increasing indisposition to exertion, with an uncomfortable feeling of faintness or breathlessness on attempting it; the heart is readily made to palpitate; the whole surface of the body presents a blanched, smooth and waxy appearance; the lips, gums and tongue seem bloodless; the flabbiness of the solids increases; the appetite fails; extreme languor and faintness supervene, breathlessness and palpitation being produced by the most trifling exertion of emotion; some slight edema is probably perceived about the ankles. The debility becomes extreme; the patient can no longer rise from his

bed; the mind occasionally wanders; he falls into a prostrate and half-torpid state, and at length expires. Nevertheless, to the very last, and after a sickness of perhaps several months (or years) duration, the bulkiness of the general frame and the obesity often present a most striking contrast to the failure and exhaustion observable in every other respect.

With perhaps a single exception, the disease, in my own experience, resisted all remedial efforts and sooner or later terminated fatally. On examining the bodies of such patients, after death, I have failed to discover any organic lesion that could properly or reasonably be assigned as an adequate cause of such serious consequences; nevertheless, from the disease having uniformly occurred in fat people, I was naturally led to entertain a suspicion that some form of fatty degeneration might have a share at least in its production; and I may observe that, in the case last examined, the heart had undergone such a change, and that a portion of the semilunar ganglion and solar plexus on being subjected to microscopic examination was pronounced by Mr. Quekett to have passed into a corresponding condition.

Whether any or all of these morbid changes are essentially concerned—as I believe they are—in giving rise to this very remarkable disease, future observation will probably decide.”

Clinically to Addison's description may be added gastric achylia without stagnation, diminished pancreatic ferment secretion, frequent or intermittent exhausting diarrhea, continuous or intermittent albuminuria, spinal cord changes usually of the spastic type, disturbances in sensation particularly malfunction of the special senses and not rarely psychic upsets.

(b) *Acute Type of Addisonian Anemia.* This occurs infrequently. In 107 cases observed by me, it was present but five times. The following history emphasizes some of the clinical aspects of the acute form of the affection.

On January 12, 1916, there was brought to our clinic upon a stretcher a semi-conscious female aged 35. At the time of entry she exhibited low muttering delirium, lemon yellow, waxy, oily skin, pale, water logged mucus surfaces, extreme weakness and dyspnoea. The general body nourishment was moderately well preserved. The hemoglobin was eighteen per cent., the red cell count 920,000, the leucocyte count 2,300. The stained blood smear showed a large celled anemia, marked poikilocytosis and polychromatophilia and numerous normoblasts with an occasional megaloblast. The lym-

phocytes were fifty-six per cent. of the total differential count; the coagulation time was more than eight minutes.

The previous history of this patient is interesting. Up to October, 1915—three months before coming under observation, the patient was and had been in perfect health. So excellent had her health been that she was considered somewhat as a prize beauty in her county. In early October, she was affected with a form of sore throat with grieppe-like sequelae, which lasted for about ten days and left her much exhausted. The exhaustion continued, a lemon color pallor became noticeable, a swelling appeared below the edge of the left ribs, irregular temperature was recorded and five weeks following the initial illness a blood examination revealed the quantitative and morphologic picture associated with Addisonian anemia. The patient was removed to a hospital in one of the large cities of Iowa and a standard form of treatment instituted by a very competent internist. The patient made practically no progress. Anorexia, diarrhea, dyspnea, palpitation of the heart and mental changes became established. The swelling below the rib edge was proven to be the spleen, it persisted and increased and became so painful that deep breathing, lying on the left side or palpation caused exquisite distress. The blood pictured showed no change except quantitatively the hemoglobin and red cell mass slowly and steadily diminished.

In this striking picture, I would emphasize particularly the acute onset of the ailment in a previously well individual, the disease being initiated by a sore throat; the rapidly developing anemia in every respect that of a pernicious or Addisonian anemia; the clinical appearance of the patient which in the space of a few months became that which is commonly associated with Addisonian anemia of long standing; the rapid and persistent enlargement of the spleen so painful as to be described by the patient herself as feeling like a "large boil." Further examination showed this case to be non-syphilitic. A haemolytic coccus was isolated from the throat and a similar organism from the tissue of the gall bladder and the spleen. This case will be considered in detail with regard to treatment later.

BLOOD FINDINGS IN ADDISONIAN ANEMIA

Emphasis is to be placed upon the statement that the blood morphology set down by early investigators as indicating essential or ideopathic anemia or Addisonian anemia may be closely mimicked in numerous forms of anemia where the cause is known

or evident and that upon blood morphology alone or even upon quantitative blood studies alone, absolute diagnosis of the disease is not possible. The blood studies are only to be taken when considered with respect to the clinical course of the disease and possible with regard to evidences of haemolysis.

Usually there are shown a low erythrocyte count (fifteen-fifty per cent. of normal), the average being 1,200,000 (Cabot) while Quinke's case of 143,000 holds the record for low counts. The hemoglobin is decreased, but in lesser degree than the red blood cell count, thus making the color index greater than one in the majority of cases.

The fragility of the erythrocytes is increased. The platelets are diminished, often absent. The normal is 500,000 (J. H. Pratt), while in pernicious anemia they usually are less than 100,000 per cu. m.m. The stained smear shows nucleated red blood corpuscles and multitudes of large and small, misshapen and contorted red blood cells. Cells measuring from two to twenty microns in diameter (microcytes and macrocytes), "dumbbells," "doughnuts," "pears," "commas," "ovals," "pseudopods" and "rings" (poikilocytes) are common. Nucleated red blood corpuscles are frequently present at some stage of the ailment. They vary in size and are designated microblasts, normoblasts and megaloblasts, accordingly. Cells containing Howells nuclear particles are often seen. These various blast cells represent the reserve currency of the bone marrow and indicate that the demand for erythrocytes is so imperative that the marrow, being unable to produce matured cells, throws off their parent form—the erythroblasts. The degree of the marrow's embarrassment is probably indicated by the type of blast found in the circulating blood, the more primitive the nucleated cell, the more urgent the systemic call for red corpuscles. In very severe cases, however, no nucleated cells may be seen. This probably indicates almost complete marrow exhaustion.

Besides nucleation, the circulating red blood corpuscles show polychromatophilia, reticulation, Ehrlick's "spotting," vacuolation and rarely basophilic degeneration.

There is a marked leukopenia, usually about 3,500, although counts as low as 330 and as high as 13,000 have been reported. Higher leucocyte counts are rare. They probably are associated with active infection or the free absorption of toxic agents which temporarily stimulate the defensive mechanism in the blood making centers. Evidence suggestive of this is adduced from the prompt

leucocytosis following blood transfusion with or without associated splenectomy.

The leucocytes are of smaller size than normal, myelocytes more numerous and often basophilic granules are seen in the cytoplasm. The differential counts usually show an increase in the small lymphocytes and a decrease in the polymorphonuclear percentages—in fact, the normal percentages are often reversed, so that lymphocytes outnumber polymorphonuclears three to one. Such reversal of the normal differential leucocyte ration might be interpreted as indicating diminution of the blood's defensive mechanism.

CHANGES IN THE BLOOD PLASMA

Coagulation time is prolonged, but not so greatly as in hemophilia and icterus. Our cases ranged from three to ten minutes. The appearance of the blood is watery, milky or greasy, and sometimes it is nearly impossible to smear it evenly on a slide. Ehrlich describes the flow from a puncture wound as "streaked." The volume of erythrocytes, as determined by the hematocrit of Oliver, is lessened out of proportion to the serum, which is often pinkish in color from the free hemoglobin. The specific gravity of the serum, freed from corpuscles, is nearer normal.

Nayen and LeNoble say that the fibrin is decreased and that the clot in pernicious anemia does not retract even after seventy-two hours. Other observers do not agree to this statement. We have noticed that the clot is soft and insecure, and is easily dislodged.

Blankenhorn has recently demonstrated an increase in the bile pigment in the blood in cases of Addisonian anemia. There would also seem to be variations in the cholestrin and iodine factors. It has not been constantly shown that the lytic bodies are increased. In certain cases it has been shown by Eppinger and by King that the blood serum contains an increase in the unsaturated fatty acids in the blood some of which have been shown to be highly lytic.

PATHOLOGIC ALTERATIONS

General. The most striking feature of the disease is the general fatty degeneration of the systemic non-striated and heart musculature and of the liver, kidneys and bone marrow. All the body tissues are hydraemic except the spleen which is commonly firm and congested. Multiple small hemorrhages into meninges, brain, spinal

cord and retina are not uncommon. Such lesions are, however, not especially specific of Addisonian anemia. The researches of Hunter and others would, however, indicate that in Addisonian anemia there are specific changes which have been commonly overlooked by many observers.

Hunter lays particular emphasis upon the lesions in the mouth. It is a common observation that in many forms of severe anemia infected gums, tonsils and nasal accessory sinuses are coincident. Not infrequently the infecting organisms are haemolytic cocci or bacteria. Decayed, broken teeth are very generally noted. Hunter emphasizes the importance of these long persisting infections with respect to a peculiar glossitis which he claims is quite characteristic for Addisonian anemia. We, ourselves, have noticed the tongue changes as being practically constant in haemolytic anemias of Addisonian type, in fact, we have never seen a true case of Addisonian anemia in which the tongue did not show varying degrees of atrophy of the mucous membrane and hyperplasia of the muscles of the tongue. Hunter claims that there is no other anemia in which the glossitis is so constant and persistent. He claims that the glossitis fluctuates in severity as does the disease and that the preence of the glossitis accounts for the alterations in the special senses particularly of taste so characteristic of the disease. Hunter has shown that while in many severe anemias, superficial inflammatory changes of the tongue are quite common, in Addisonian anemia there is an actual invasion of the lymph spaces and muscle bundles of the tongue with lytic streptococci. Hunter claims that the tongue furnished the most important portal of entrance for these bacteria or their toxins into the general circulation. Tissue cultures from the tongue would apparently show these organisms in pure culture. Pathologic changes similar to those observed in the tongue have been observed in the stomach wall and that of the large intestine. In the early course of the disease, the gastro-intestinal lesions are of the ulcerative type, later inflammatory action results in a scar tissue with atrophy of the mucosa and muscularis. Haemolytic bacteria can often be isolated from the walls of both stomach and intestine, upon tissue culture after the technic of Rosenow.

In our clinic, tissue cultures have been made of removed appendices and gall bladders. While grossly all these appendices and gall bladders show chronic inflammatory changes with or without evidences of ulceration, in some of the specimens, streptococcus veri-

dans, lytic staphylococci and organism of the colon group have been recovered.

Besides fatty change and frequent enlargement, the liver presents a rather characteristic picture with respect to the distribution of iron pigment. The deposits of iron pigment are increased from six to ten times the normal amount. This increased iron is characteristically deposited in the outer and middle zones of the lobules. This increase of iron pigment does not occur as result of iron medication nor does it occur in secondary anemias to such extent nor in such position. By Charnas and Schneider's methods for the estimation of blood derived pigments, duodenal catheterized fluid appears characteristically to reveal a great increase in the elimination of urobilin and urobilinogen by the liver. In only the lytic anemias is this great increase in blood derived pigments constantly found. This observation is of value in separating instances of true Addisonian anemia from anemia where the blood morphology indicates a severe anemia often carelessly called "Addisonian."

Examination of the kidneys in pernicious anemia shows increased iron deposits. In the urine are demonstrated increased urobilinogen and hetero- and perhaps iso-hemolysins.

BONE MARROW

Smears of the bone marrow reveal in the early stages of pernicious anemia megaloblastic hyperplasia in the majority instances. This is apt to be succeeded by aplasia which represents an overwork or fatigue. In certain cases of Addisonian anemia aplasia may be early manifested. Bone marrow cultures have not been made in sufficient number of cases of Addisonian anemia to enable one to state definitely whether or not there is actual bone marrow infection but evidence is accumulating which offers to substantiate this opinion. It would appear that the bone marrow changes may represent reactions to the haemolytic agent. It would seem in Addisonian anemia the bone marrow is not primarily at fault. Injections with pure cultures of staphylococcus pyogenes aureus cause definite bone marrow reactions closely resembling the megaloblastic reactions produced in Addisonian anemia. Following the injection of non-bacterial hemolytic agents as has been described by Bunting similar changes are observed. It is quite likely that in Addisonian anemia, widespread infection with hemolytic cocci retards blood formation.

SPLEEN

Spleens removed at laparotomy from cases of Addisonian anemia in our clinic almost universally show increase in size, blood congestion, chronic peri-splenitis and often increase in weight. On sectioning the tissue evidences chronic hyperplasia. The iron content is greatly decreased. In some instances of Addisonian anemia tissue cultures from the spleen pulp have returned hemolytic cocci and colon-like bacilli. Spleen extracts have not exhibited increased iso- or hetero-haemolysins.

It might be well to review certain functions performed by the spleen. Even though the exact use of the spleen is unknown, it would appear from its embryology to be an important organ concerned with digestion or assimilation of food. It will be recalled the blood supply of the spleen comes from the coelio axis as does that of the stomach, liver and pancreas. The spleen is derived from the fore gut as are also these organs. Its venous efferents are direct tributaries to the portal circulation. The chief functions of the spleen would appear to be those connected with control of blood formation and with blood destruction. In the human embryo erythrocytes are produced by the spleen but at birth this production ceases and the bone marrow becomes practically the sole source of the red blood cells. The spleen is, however, intimately concerned with the production of leucocytes. Kolliker and Ebener found more leucocytes in the splenic vein than in the splenic artery. The large mononuclears (splenocytes) formed in the spleen probably do not enter the blood stream but remain and serve as partial sources of haemolysis. There is reason to believe that even normally the spleen exercises a certain degree of inhibition upon the bone marrow, influencing the formation and the addition to the circulation of both red and white cells. Lethaus, Kuttner, Roetner and Lagg have noted polycythemia following removal of the spleen traumatically ruptured. Schupfer, Levison and Muhsan and Mayo have similarly noted increased red cells following splenectomy in Banti's disease. The tremendous medullary reaction after splenectomy in pernicious anemia has been commonly noted. Sometimes the pain in the long bones following the operation is definitely associated with this increased medullary activity.

That the spleen bears a direct relation to iron metabolism has been abundantly proven by the work of Ascher and his pupils, by Schmidt, Voegel and Baer. It seems probable that the spleen is a

depot for iron derived from destruction of blood and tissue cells. The liver stores the iron coming to the body in food. After splenectomy Baer has shown a marked reduction in hemoglobin when animals receive but little iron in the food and rapid improvement when iron is added. Pearce has emphasized that the iron in uncooked food, particularly unboiled food is of greater benefit after splenectomy than that in cooked or boiled food and from this observation thinks that the spleen is in some way concerned with the process of indigestion. Increased siderosis may be an indication, therefore, of general tissue cell destruction. Increase of iron bearing pigment in the liver and kidneys is, on the other hand, characteristic of active haemolytic processes and especially of active haemolysis in the spleen. Just what function the spleen has in digestion is not known. It may have some influence with respect to stomach and liver hyperemia. It does not seem to be directly concerned with the proper elaboration of pepsin and trypsin. Certainly after removal of the spleen in Addisonian anemia, Banti's disease, etc., there is a tremendous improvement in appetite, less gastric distress and frequently of vomiting. The relation of the spleen to the ductless glands and the haemolymph nodes is still undetermined. Certainly after splenectomy, enlargement of the thymus, thyroid and haemolymph node is not uncommon. Such have been noted by Tizonni, Mosler, Warthin and Dock, Pearce and Austin and others. The latter observers have shown that after splenectomy in dogs there is a great increase of the endothelial cells in the lymph-nodes and have found that these cells may become phagocytic for erythrocytes following the injection of haemolytic serum. Eppinger has pointed out that the failure of splenectomy to benefit certain cases of pernicious anemia may be referred to the increased hemolytic activity of many newly formed hemolymph glands.

The relation of the spleen to infectious disease has been frequently commented upon. It has been generally supposed that the spleen acts as a power for good in the struggle against infections. There is no evidence to show that immune bodies are more favorably developed in the spleen than they are in other organs. Patients without spleens have not rarely been shown to survive from severe infectious disease. It may be that in such circumstances the hemolymph nodes take on the function of the spleen. The relation of the spleen to neoplasms is worthy of notice, primary cancer of the spleen is extremely uncommon. The injection of spleen emulsion into rats has been shown by Osser and Pribam to be followed by

retrogressive changes in rat tumors. Murphy has shown that rat sarcoma will grow freely in chick embryos only before the development of the spleen. Carroll has found that connective tissue growth is greatly activated by extract of adult spleen. Eppinger on the other hand has shown that the removal of the spleen in man may be followed by greatly accelerated tumor growth.

The Relation of the Spleen to Hemolysis. Under normal conditions there is maintained a delicate balance between blood destruction and blood production. The bone marrow reacts sensitively to increased carbondioxide tension of the blood to the products of red blood destruction and to many chemical and infective agents. It is not to be doubted that normally the spleen prevents entrance into the blood stream of materials which would stimulate excessive bone marrow activity. Normally there is little, if any, active destruction of red blood cells in the general circulation. Their slow destruction is brought about mainly by the spleen although there is some haemolysis in the liver and bone marrow. The spleen causes red cell destruction by autolysis and by phagocytosis. The iron of the blood cells is deposited as an albuminate of iron mainly in the spleen and is used later in the formation of new red blood cells and hemoglobin. In the absence of the spleen, Gilbert, Chabrole and Benard have demonstrated that the liver may transform hemoglobin into bile or bile pigment.

In Addisonian anemia, numerous authors notably Kelliger, Benti, Minkowski, Hunter and Chauffard and Eppinger assign a very active rôle in the hemolysis to the spleen. They maintain that in this disease, there is a definite hypersplenism and that the red blood cells are destroyed far in excess of their rate of manufacture by the bone marrow. Other observers as Ponfick, Goodall and Achard maintain that the spleen is increased in size in pernicious anemia as the consequence of the excessive quantity of products of blood destruction brought to it. It is also maintained that a combination of the two views is possible, namely, that blood destruction may be primarily initiated elsewhere than in the spleen and that as a consequence of the toxic products brought to it the spleen responds with an overwork hyperplasia with the resultant over-normal hemolysis. Under such circumstances it is apparently evident that removal of the spleen in an ailment such as Addisonian anemia cannot cure the disease unless the primary haemolytic fault is eradicated.

Effects of Splenectomy. In our clinic, Percy has observed that

immediately after splenectomy a polymorphonuclear leucocytosis generally appears, due probably to necrosis of tissue following operation, being a chemotactic, phagocytic reaction. The nucleated red blood corpuscles become more numerous at first, especially Howell's cells, after which they gradually disappear from the circulation.

After a slight fall following the operation, the red blood count and hemoglobin steadily rise. The stomach symptoms are improved, and there is a decided gain in weight and strength. In some patients a sensitiveness of the long bones is present. The red cells tend to lose their misshapen condition and become more uniform in size. Lee, Vincent and Robertson say that products of red blood corpuscles destruction (i. e., bile pigments) decrease in the excreta—the cells become more resistant to hypotonic salt solutions. Platelets appear or increase in numbers—the color-index falls to approximately one, and the normal ration between polymorphonuclears and small lymphocytes is gradually established after the initial polymorphonuclear leucocytosis declines. The abnormal blood cells generally disappear in from six to twelve weeks.

The Problem. From the above clinical review of the work of others and ourselves, it would appear that the problem of treatment embraces certain fundamental principles. It would seem that in the proper treatment of true Addisonian anemia the clinical and therapeutic treatment indicated includes the (a) attempt to bring the patient's blood serum within the biologic normal by such procedure as diluting or antagonizing lysins and supplying and stimulating the production of specific protective anti-bodies; (b) the attempt to remove radically active foci containing lytic bacteria or to counteract the constant or intermittent absorption of their toxins or their spread to new localities; (c) the attempt to simulate normal red cell production in the bone marrow or to temporarily substitute an adequate number of normal red blood cells until bone marrow damage is repaired; (d) the attempt to improve the patient's general state by stimulating or supplying normal alimentary secretions, preventing the absorption of injurious end digestion products from the digestive tract, stimulating the circulatory mechanism and the excretory function of the liver, kidneys and surface glands; (e) to attempt the protection of newly formed and old red blood cells in selected cases by removal of the hyperlytic spleen and intra-abdominal infected tissue.

TREATMENT

(a) *The attempt to bring the patient's blood serum within the biologic normal.* Instances have been not infrequently reported where there was rapid improvement in the qualitative and quantitative analysis of the blood following saline transfusion or copious lavage of the gastro-intestinal canal with normal salt solution. In these instances, doubtless the improvement resulted from the dilution of inimical agents in the blood stream. It would appear more physiologic to bring about such change by such procedure as transfusing all or part of the constituents of normal blood. We have used transfusion with whole blood (uncitrated and undiluted) because it seems more rational to add nothing to transfused blood nor take anything from it (as by the citration of blood or its defibrination). In all instances we have found the Percy modification of the Kimpton-Brown method a practical and useful clinical procedure. Donors have been selected by the method advocated by Walter Brem. In our cases, the average number of transfusions were 3.5 given at six to ten day intervals and the average amount of each transfusion was approximately 650 cc. Not rarely, the patient requires transfusions even after laparotomy. We have found transfusions the quickest and most satisfactory way of counteracting relapses and stimulating general metabolism.

(b) *The attempt to counteract the effects of low grade infection.* While the patient is being transfused (at intervals), search for local infective foci is carefully made. Radiographic, cultural and physical evidences of such are commonly found in tonsils, about teeth roots, in the sinuses accessory to the nose and occasionally in the ear or in superficial lymph gland change. When such have been located, they are radically removed as far as is practical. Particular attention is paid to the removal of infections about the mouth or throat where, in this type of ailment, they appear to be particularly common. As we have above mentioned, emphasis has been placed upon this condition by William Hunter. Our cases strongly substantiate many of Hunter's observations. The improvement in general well being and the character of the blood have not infrequently been very prompt and marked.

(c) *The attempt to stimulate normal red cell production* includes frequent massive transfusions as well as attention to the general body demands. It has frequently seemed to us that the chief function of transfusion appeared to be that of supplying blood function

physiologically and giving the bone marrow an opportunity to recuperate. It has seemed not unlikely that the circulation of good blood in the bone marrow locally destroyed harmful agents and later on permitted a bone marrow blood production of increased vigor and approaching normal in quality.

(d) *The attempt to improve the patient's general state.* Many of our cases of Addisonian anemia exhibit evidences of general under nourishment either chronic or intermittent. It is not sufficient that enough food be taken but it is necessary that a proper amount of food be absorbed into the lymph or blood stream. All of our cases have exhibited gastric achylia with good motility. By clinical and laboratory tests, pancreatic achylia especially for proteins and fats has been demonstrated. Quantitatively the bile has been normal or is increased in amount but qualitatively there have been such departures from the normal as excesses of blood derived pigments and possibly such agents as stimulate pancreatic flow or the production of duodenal or jejunal secretions. Dietetically we have, therefore, suggested a diet limited with respect to proteins and fats. The digestive function has been improved by the use of hydrochloric or tartaric acid following meals and frequent doses of calomel not for the purpose of moving the bowels but with the object of bringing about a relative sterility of the intestinal canal. In a few instances, various preparations of enzymes have been administered along with large doses of calcium carbonate but apart from the diminution in the volume of the stool, we have not noticed that their value has been great. The renal activity has been stimulated by the free ingestion of pleasant table waters or by distilled water and the cardiac mechanism generally responded satisfactorily to rest, massage, frequent baths, caffeine and digitalis. It is important to keep patients affected with this ailment at rest in bed especially during the periods of transfusion. There is no objection to their being out-doors in all kinds of weather, provided they are properly protected from sunburn or extreme degree of cold.

(e) *The attempt to protect newly formed and old red blood cells by surgical procedure.* Inasmuch as in certain instances of Addisonian anemia it appears that intra-abdominal foci of infection exist and that there is increased blood destruction by the spleen and the hemolymph nodes, certain cases that were in fair physical shape, whose blood picture, could not be kept improved by transfusion, removal of superficial foci of infection, diet, etc.; and in whom there were not evidences of extensive or progressive cerebral

spinal damage, have submitted to a laparotomy. *Such laparotomy should always be exploratory in the fullest sense of the word.* Not infrequently, the surgical operation of splenectomy is performed but only rarely does laparotomy reveal that the spleen alone is diseased. In only three of twenty-seven consecutive instances was splenectomy alone performed. In twenty cases, the spleen, gall bladder and appendix were removed, in three cases the spleen and gall bladder and in two others, the spleen and appendix. Tissue cultures from the gall bladders and appendixes removed, as has been mentioned above, not rarely disclosed active infections with lytic cocci or bacilli of the colon group. Such organisms have also been isolated from removed ovaries and tubes.

DR. R. W. WILCOX: It is a little dangerous for a speaker to quote Holy Writ because another quotation may be found to refute the first. I believe that there was one individual in the Bible who was supposed to have subsisted seven years on a vegetarian diet, that is, on grass. Nebuchadnezzar was the name of this person. I am very much interested in the question of vegetarianism. Very few persons are absolutely strict vegetarians, although they claim to be. I know of one man, a physician, who was a fairly strict vegetarian, and it is remarkable to note in this connection that the more nearly a person approaches a non-animal diet, the more sweets he is apt to consume. They are also likely to be inordinate users of tobacco. So-called vegetarians often consume a considerable number of eggs in their diet. In Europe one often finds vegetarian restaurants, but the only palatable article they seem to offer is a really delicious chocolate, and this seems to be the only excuse one would have for wishing to patronize such an institution. I would like very much to express my appreciation of Dr. Cornwall's scholarly presentation of this subject and I hope that the response of the members by discussion will be generous.

DR. FIELD: Mr. Chairman, I consider this subject to be one of tremendous importance. We should all, as internists, appreciate Dr. Cornwall's scholarly presentation of this matter. In my own work, I am the director of the radium institute in New York City, my attention is constantly called to the study of patients in this condition. Cancer cases, of course come to us for treatment, and in ninety-five per cent. of the cases they have received every other kind of treatment first. The Germans have written for the past ten

years on the value of radium in internal treatment, and the cases sent to us, are where diet, where all known treatments have failed. Many cases come to us running a blood pressure of from 180-240, with extreme kidney or heart lesions or both. It can here be stated that if any result in these cases is obtained from the administration of radium, it comes from the action of the rays on the body metabolism, that is the body ferments. Even with the most minute dose of radium water, there is an enormous increase of solids in the urine, with corresponding vascular dilatation. It is certainly true, as Dr. Cornwall says, that the pressure should be slowly and gradually brought down, but where one can bring about an improvement in the action of the kidneys, dilatation is a safe procedure. The patient may have been on an extremely restricted diet for six years and yet the blood pressure can be brought down thirty points. These results show a fair degree of permanence. I have noted continuance of results after $3\frac{1}{2}$ years. The importance of these conclusions is enormous. The number of business men who are going down every day with cardiovascular disease is appalling. The first symptoms of degeneration of the cardiovascular system must be studied. As Dr. Cornwall has stated, if one can head off the first beginning of degeneration, the changes in the valves before disturbance starts in the blood vessels, then the profession has in its hands one of the most important phases of internal medicine that it has ever had to deal with.

DR. TICE: It would seem at the present time that the question of diet is of the utmost importance in dealing with cardiovascular disease, and this, in turn, is closely bound up with the question of *tonus*, or cardiac power. Diet plays a large part, both in the production of disease and also in the restoration of cardiac efficiency. A very important thing is the reserve power of the heart and its ability to return to its *tonus*. The question that concerns the profession is not so much whether the actual involvement is myocardial or aortic, what is the functional ability still possessed by the heart. This again hinges, not only upon the question of actual change and vascular capacity, but also whether or not the heart is receiving its proper amount of nutrition. Whether this is to be corrected by regulation of diet; or to attention to other metabolic disturbance, by increase of elimination; by radium therapy; mechanical therapy; or any other we may use; the whole thing rests upon the re-establishment of cardiac *tonus*, which practically means cardiac function.

DR. R. W. WILCOX: I would like to suggest a correction to the first speaker. He mentioned cardiovascular dilatation; I am sure he meant "vascular dilatation." How does radium act? So far as I know but little reliable research has been undertaken and the results of it are by no means conclusive in supporting the claims made by chemical officers.

DR. BAAR, Portland, Oregon: The first thing radium does is to cause leucocytosis. Whether this increased leucocytosis has anything to do with increased metabolism, and thereby elimination of toxins and consequent prevention of arteriosclerosis is, as yet, a purely speculative question. When we ask if radium stimulates enzymes and hormones we are surely as yet dealing with abstract metaphysics. So far as we know now there is leucocytosis and *nothing else*. Internists must stick to their ground. Leucocytosis is as much of a conundrum now as it was 2,000 years ago. We can't say anything new about it.

DR. BARACH: I would like to touch upon one or two important points. For the last twelve or fifteen years I have been specially interested in the subject of cardiac hypertrophy. I would like to bring to your minds that efforts at cardiac compensation occur frequently in adolescent boys, and youth of college age. We do not have the opportunity to study girls at this age so much, but in boys, it is perhaps the result of increased muscular activity. Often in these subjects, up to and during the college age, we find the apex is prominent and there is an increased area of dulness, although we do not state that a boy has an hypertrophied heart because the dulness goes beyond the average. This may be only functional, and not pathological. I have an opportunity to see many college boys and in the Carnegie technical schools from three to five thousand are examined every year and frequently there is a condition of cardiac hypertrophy. In regard to athletics, the men who train for the Marathon race of twenty-five miles are in training several months of the year. These men show increased blood pressure and enlarged hearts on physical examination. In these cases there is a true hypertrophy. Shortly after the maximal effort, many of them show broader hearts with symptoms of dilatation. Within a few weeks many of these hearts return to the normal size, so that as soon as there is relief of the excessive strain the condition disappears. This shows that the hypertrophy is in response to the demand of the organism. I know of one man who came to

me and for fifteen years he had been in the practice of keeping in training to run twenty-five miles, for no other reason than that he thought he was smart for doing it. This man had a permanent hypertrophy of the heart. Another thing that is apt to happen when these college boys run five, ten or fifteen miles, the most of them come back showing signs of albumin, red blood cells and even casts in the urine. This condition can be produced within five minutes after commencement of the effort. It is not surprising that casts can be thus produced, by excessive effort for a few minutes, but the point to be borne in mind in connection with this sign is that an albuminuria may be very transient and when a patient comes into the office with this symptom, it does not necessarily follow that it is a serious condition. The history of medicine after the Civil War shows that there are many cases of damaged hearts. We wonder if there will be any interesting and startling results recorded now in the army as many men who have lived sedentary lives will be obliged to undertake long marches. It is probable that many of these will show enlarged hearts and many latent weaknesses will be developed. There is a class of cases which come in the hypertension class. These patients exhibit all the symptoms of hyperthyroidism. They have the nervous symptomatology, sugar in the urine and exophthalmos, associated with hypertension. After ten days or so of treatment by rest in bed a remarkable change is brought about in the nervous condition. They no longer show signs of the "excessive kinetic drive" of Crile. This class of patient is remarkably amenable to treatment and breaking the vicious circle will produce a remarkable improvement in the state of hypertension. During the past few years I have noticed several patients of the large, obese type, having a low blood pressure, 110 systolic, they also had albumin and casts in the urine. These cases have rapidly, that is within a year, progressed to the stage of hypertension, 160-180 systolic pressure, which shows how quickly the hypertension may develop. These symptoms are apt to have their beginning in early college days, but in middle life they develop very rapidly.

DR. BAAR: We may have some very interesting speculative ideas in regard to this matter. I have not seen this matter published anywhere, of which I am going to speak. A year ago I noticed a man of seventy years of age, who had had a prostatectomy done. He had a pressure of 140. A week after he left the hospital I

took the blood pressure and found it to be 240, but he had no subjective symptoms at all, no albumin, no casts, absolutely nothing pathological. I treated this man with prostatic tablets and the pressure dropped to 170 and stayed so. I wish to mention this for the sake of priority, not because we can prove any definite connection in this case.

DR. A. CAILLÉ: I would like to express my appreciation of Dr. Cornwall's presentation. He has approached the subject from a point of view that makes us think that we are at last getting away from "tinkering." A slight improvement in nomenclature might be suggested; I would prefer to say cardiovascular diathesis, instead of cardiovascular disease; that, however, is a minor point. As to the importance of a restricted diet, I fully agree with the speaker. A carbohydrate diet with milk derivatives is indicated in these conditions. I would like to say a word about high blood pressure. I think Dr. Cornwall mentioned that the adjustment of diet and vasodilators are indicated. That is true. I have found also that a venesection, done two or three times a year will carry these patients on for many years and can be of considerable comfort without much trouble.

DR. IVES: I merely wish to discuss this paper from the standpoint of food and metabolism. I think when we go into the question of amino-acids, we are somewhat out of our depth. Speaking in terms of eggs, meat and milk, we can work our conclusions out clinically. It must be remembered that not all of these patients with cardiovascular disease are adults, and therefore it is not always a case of faulty metabolism and high pressure. Some of the problems have to be considered from the point of view of toxemia. There is always some damage to the cardiovascular tract in infectious disease. The doctor spoke of rest; rest becomes an imperative factor for a much longer time than the period of illness. From the standpoint of high pressure, mention has been made of prostatic tablets. In senility it is to be remarked that there is often a low pressure, a hypo-tension. With these patients, one should advise a course of thyroid or pituitrin and they may respond beautifully in their pressure curve. This shows that there is something depressive in the lack of internal secretion, even with cardiovascular disease. A course of thyroid or pituitrin will restore the patient to normal health.

DR. HEINRICH STERN: The alimentary tract of the occidental human being is not fitted to elaborate completely the vegetable nutrients or their contents. We must not forget that in the oriental races, such as the Japanese, a much smaller race—the alimentary tract is from three to six feet longer than in the European. This extra three to six feet undoubtedly serves some special purpose in metabolism. According to experiments made in Tokio there is no diet more suitable to the Japanese than the one they are best fitted to elaborate. They do well with carbohydrates. I understand that they don't use milk at all, nor do they make use of milk derivatives, including butter and cheese.

DR. R. W. WILCOX: The Chair was interested in the reference to "tinkering" in medicine. I would like to refer to the use of the sphygmomanometer in clinical medicine. In 1300 men, veterans of the Civil War, the majority having reached the age of seventy, a very frequent sign that was observed was an extremely low blood pressure. At the same time there were great variety of serious forms of heart disease. It is unnecessary in a society of this scientific prominence to observe that the sphygmomanometer is of no more and no less use or importance than other instruments of precision, for example, the clinical thermometer. High or low pressure is not to be considered *per se*. It merely affords all opportunity for investigating as to the cause thereof. We hope that the object of this organization will be to stop "tinkering" and get to the bottom of things. This paper of Dr. Cornwall's shows that we are fulfilling our mission as internists.

DR. E. E. CORNWALL: There are very many interesting points which have been brought out by the discussion. In the first place, as to the name cardiovascular disease. It is, I admit, a clumsy name, but it does mean a wearing out, a clinical syndrome. Other names are much better perhaps; cardiovascular-renalism would be a better term, but we have become accustomed to the other and we understand it to express the general syndrome. As to Dr. Baar's remark about our having learned nothing in 2000 years about leucocytosis, I don't quite agree with him. We have learned the name, at least. In regard to the use of dilators—anything like the use of dilators is absolutely wrong in the majority of cases. We must understand that these symptoms are a manifestation on the part of nature that she is trying to compensate the damage. It is when nature overdoes her part and injury is threatened to the vascular

structure—then, and then only, have we any right to use the artificial methods of relief and to save the rest of the organism at the expense of the mechanism. I think the use of dilators is a great deal overdone. As regards venesection—that is a mighty good thing to do sometimes. It has saved life many a time. When there is a low diastolic pressure an arterial dilator should never be used. In regard to amino-acids, which have been spoken of in a somewhat slighting tone, amino-acids are the end products in the digestion of protein. The vegetable proteins are not as conveniently used in body metabolism as animal protein. As to vegetarians, those who eat eggs or milk are not strict vegetarians. In regard to the length of the alimentary tract, no doubt a shorter alimentary tract requires a little meat, but the tendency to-day is to eat too much. A certain amount of meat is useful. A person born with a constitutional predisposition to gout, apoplexy, Bright's disease or cardiovascular disease should take a low animal protein diet. The phenomenon of low blood pressure being seen in old persons is not unusual. It is frequently seen and such persons are often comparatively healthy and get along very well. There are some common factors which may produce this symptom. The first is chronic tobacco poisoning. This will lower the systolic pressure. Second, an intestinal toxemia will sometimes lower the blood pressure, though this depends on the type of bacterial poison. A colon bacillus toxemia will raise the blood pressure, at least it does so in animal experimentation. Thirdly might be mentioned a constitutional habit.

DR. R. W. WILCOX: There is one clinical symptom which these patients present, which is noted by Addison and which has not escaped the observant eye of Dr. Smithies; namely mental deterioration. This does not proceed *pari-passu* with the blood picture. It is, however, a matter of great importance occasionally as it may occur in the course of a judicial inquiry. This is a wonderful paper and invites extended discussion. There are many points in it which have not been enlarged upon owing to lack of time. One point that might be justly called "tinkering" was treatment of this disease by splenectomy *per se*.

DR. BARACH: I believe this is one of the first indications we have had that we are getting down to the underlying cause in pernicious anemia. We have been wandering in a maze without knowing where to go. Now we see that infection is a very likely source of

the trouble. It has been lately recognized that infection round the mouth is a probable source of much trouble. Efforts have been directed toward the removal of pyorrhea which is a frequent accompaniment in these cases. The picture of the tongue in pernicious anemia is characteristic—the red, beefy, smooth, cracked tongue is prominent. Relapses are always associated with ulcerations of the tongue. I have touched these ulcers with nitrate of silver, not because I thought it a good thing, but because I did not know what else to do. Dr. Barker's discussion of pernicious anemia was based on general lines of hygiene, the supply of hydrochloric acid and of intestinal antiseptics. Dr. Smithies has given us something more tangible to work upon. It may be added that in certain cases treatment directed against infection seems to have done some good. Intravenous injection of salvarsan, which perhaps acts as an antiseptic on the bacterial side, has been of use, I have seen remarkable results in some cases. There was a marked reaction and rise of temperature. I think there must be a great deal of truth in the theory of infection. If you follow treatment along this line you will get surprising results.

DR. FRIEDMAN: I have not had experience with acute pernicious anemia, but I have observed some patients for from eight to ten years. Everyone knows that in pernicious anemia there occur blood crises, especially in the initial stages. On one examination you will find a typical picture, and one month later the picture is questionable, for instance megaloblasts will not be found. Improvements in the blood picture do occur even without treatment. I don't know why the blood picture does not remain constant. It never impressed me that splenectomy could benefit the patient because the enlargement of the spleen is certainly a secondary condition in pernicious anemia. In hemolytic jaundice, which is due to hypersplenism, this really is of service. I have a patient who is well now two years after splenectomy for hemolytic jaundice. The two conditions are different. In pernicious anemia enlargement of the spleen is not so pronounced as in other conditions. The spleen below the umbilicus is rare. The primary condition is not in the spleen or in the bone marrow. As to the infectious nature of the disease, I think Dr. Smithies has produced good experimental evidence in his cases. We are accustomed lately to attribute all latent infection to the tonsils, but we should also consider gastric ulcer, duodenal ulcer, appendicitis, poliomyelitis. We shall soon be look-

ing for the primary site of all these infections, which used to be considered the tonsil. If these cases of pernicious anemia can be attributed to infection the discovery is of great importance to preventive medicine. In regard to achylia gastrica, I have never seen pernicious anemia without this symptom. If there is no achylia, diagnosis should be made with great reserve. Some years ago I had a case with typical picture of pernicious anemia—with normoblasts, megaloblasts, enlarged spleen. The man was seen also at the Roosevelt hospital, and they refused to make a diagnosis of pernicious anemia there, because achylia gastrica was not present. It seems to me this symptom is necessary to complete the diagnosis.

DR. BAAR: If I had had nothing else to repay my trip here, I should have been abundantly compensated by listening to this paper, from which I have learned very much. I have gotten the same results, but in addition I have always observed a constant indicanuria, as well as the achylia gastrica. This has always given me the clue. If I don't find that, the case falls into the other category mentioned by Dr. Smithies. In one case, a boy of nineteen, with enlarged spleen and liver and tender gelatinous swelling of the glands I tried salvarsan injections. The hemoglobin improved from thirty to seventy-five per cent. and all swellings subsided except the parotid swellings. Later the patient had erysipelas from which a streptococcus was recovered. Then he had a focus of infection in the sphenoid. He took a vaccine treatment. Then a purulent iritis broke out. He had the same coccus in the blood, the parotid and the naso-pharynx. He had a pronounced indicanuria. As this disappeared, the man's hemoglobin's came up. In another case of supposed pernicious anemia, in a woman, I found perforation of the nasal septum. Salvarsan cleared up the condition, which was congenital syphilis. The immense value of the "cocci" statement must be appreciated. I don't think it is a case of looking for bugs in the tonsils. They are there undoubtedly in many cases. Some of the anemias are also frequently syphilitic.

DR. W. H. MERCUR: I am interested as to the statement by Dr. Smithies as to the performance of fifty-one laparotomies in this condition. There is a general impression that splenectomy is the cure for this condition. Splenectomy is only a cure when the spleen is the focus of infection; in other words, if the appendix or the gall bladder is the point of bacterial infection, taking the spleen

out won't cure the disease. I remember Dr. Osler, some years ago, in a case of pernicious anemia, said "look at the mouth;" the man had decayed teeth. We learned to look for trouble with the teeth. In regard to transfusion in these cases, one point advocated by Percy is of value. One may take all precautions to prevent hemolysis and still it may occur and cause serious trouble. Percy takes a small quantity, one half c.c. of blood and introduces that. If it causes hemolysis the donor is unsuitable. This half c.c. will cause trouble in ten seconds, if at all, and the introduction of 300 c.c. of the same blood, if unsuitable, would cause much more trouble. Personally I have never seen cases of pernicious anemia get well. Dr. Smithies says he had twenty-six cases of pernicious anemia get well and remain so from six to fifty-one months. I saw the woman he refers to as the case of longest duration. She certainly looked robust and in perfect health. It may be that if the source of infection is removed that the cure is permanent. Dr. Barach spoke of the use of 606-Arsenic as certainly an advantage but the anemia in those cases is probably syphilitic. Bradley of Edinburgh proved that these cases in which salvarsan was beneficial were luetic anemias. An important point is that in a high degree of anemia the Wassermann is negative. In a case where the Wassermann was negative, autopsy showed lues from the brain down. Much pernicious anemia is luetic in origin. I would like to mention one case in which we were going to transfuse a pernicious anemia patient with blood from his brother. The patient had a negative Wassermann and emphatically denied lues. The donor showed a four plus Wassermann. When he was questioned he said, "Oh yes, I got that trouble at the same time my brother did," which shows that the Wassermann reaction is negative in these cases.

DR. FRIEDMAN: I would like to ask why do these patients have remissions in pernicious anemia. If these cases originate with infections, do they have reinfections? One point made I don't think was well taken. It was stated that if the infected tonsil were removed the case would get well. This does not necessarily follow, because the damage has been done, but that does not prove that infection did not produce the disease.

DR. HAYTHORN: The question that Dr. Mercur raised about the use of salvarsan in pernicious anemia should be considered. Dr. Smithies does not need my support, that is evident, but I would

say that in the last three autopsies we have had, we have recovered, either from the bone marrow, hearts' blood or spleen a virulent pyogenes and an unrecognized spirillum. Salvarsan in the blood stream is a bactericidal agent and some workers have cleared up streptococci in the blood stream by this means. Experimental animals have been saved by this means. I don't think it is necessary for persons to have syphilis to be benefited by salvarsan. The bone marrow must be reached by the injection. I would like to see salvarsan used experimentally in cases where there was no syphilis.

DR. IVES: We had an extremely interesting case at the Mercy hospital clinic this morning—an endocarditis due to streptococcus viridans in the blood. In this case the injection of salvarsan cleared the blood stream of streptococci. A second injection for the same reason raised the temperature, which came down in the course of a week. The third injection cleared up the case, which ran a normal temperature two or three days later. This would seem to indicate that the temperature was caused by bacteria in the blood, which were cleared up by 606. It would seem then that salvarsan has bactericidal action. In the case of streptococcus viridans invasion of the tonsil, disappearance of the germs can be caused by the application of arsenated mercurio-inesol.

DR. FRANK SMITHIES: I wish to thank the members for their interesting discussion. In my fragmentary presentation, many points necessarily were left uncovered. In this disease we have definite evidence of the infective process in the mouth as in pellagra, kala-azar, sprue, etc. The first treatment is by chlorate of potash mouth wash, or one-half per cent. formalin wash, before anything else is done. Many of these cases are non-luetic by laboratory tests and it is concluded that the action of salvarsan is bacteriolytic. I am glad to hear reports from Dr. Baar of intermittently active infections in pernicious poisoning. The type is a low-grade septicemia, by protein end-products poisoning. Salvarsan reactions upon the temperature and anemia and one could class this disease with low grade intermittent infection, much as kala-azar. We have not employed salvarsan in every case. Two had had salvarsan before they came to us. Any chronic anemia, such as anemia in cancer, may be called pernicious. The anemia is a lytic anemia, whether it is caused by bacterial or metabolic products. In the study of immense material, Cabot states that ninety-nine per cent. have died within

three and one-half years. The report of blood tests showed that our patients had had all the remissions they were going to have before they came to us. Forty per cent. were brought in on stretchers; some in extremis. We don't know about spontaneous cures, but we do know that spontaneous cures have not been hindered by anything that we have done. Recurrences are not uncommon after splenectomy. The hemo-lymph nodes in the spine may take on the function of destroying the red blood corpuscles. Patients may come back with recurrence. We have definite alterations in the hemo-lymph nodes which have taken up the functions of the spleen. Dr. Friedman spoke of focal infection. It is not sufficient to say infection about the teeth or tonsils, but it is important to say *what type* of infection. We may have vigorous growth of harmless organisms or very slow growth of very pathogenic organisms. These can produce serious damage. Removal of the tonsil does not cure this. There may also be mutations of organism which are harmless into those which produce serious lesions. Rosenow has shown this. In regard to achylia gastrica—I agree that this is a constant finding in pernicious anemia, also pancreatic achylia. This is, however, the end result, where the damage has been done. We ought now to study the living pathology instead of centering our attention on dead-house pathology. If the surgeon has done nothing else, he has contributed a certain amount of pathology while the patient is still living. Posterity will laugh at us for talking of achylia gastrica and gastric atrophy. It is a symptom, not a cause. Diminished hydrochloric acid or pancreatic secretion is an end result. So it is with the spleen. It has suffered from a chronic, low grade inflammatory irritation, and there is no intense reaction as in typhoid fever. In ten of these spleens we may not find any organisms. In the next ten cases there may be organisms in the tissues of every one. The bone marrow cultures will tell us what organisms we are dealing with in some cases. I think Dr. Baar's observations about indicanuria bring out the point of the chronic intermittent type of infection in these cases. It does not matter whether it is in the gall bladder, the alimentary tract, or the appendix, so long as it is active, it will produce indicanuria. I wish to further emphasize that all we can do in analyzing these cases is to present certain facts and let men interpret them for themselves. The prophet has never been very successful, as far as history goes. The point I wish to leave with you is this, in the treatment of pernicious anemia, we don't treat the disease by splenectomy, we treat it on the basis of

any clinical, pathological, bacterial focus. That teaches us to reduce any infective foci, whether external, abdominal or elsewhere; and to counteract infection by transfusion. In addition treatment may include laparotomy to search for focal infection, and to remove the spleen if the organ requires removal.

DR. R. W. WILCOX: It may seem strange that we have had to deal with so many instances of measles and mumps, but the country boy does not have the chance to acquire immunity against these diseases. The gutter-snipe, on the other hand, is generally immune to any and every infection. The measles problem is not difficult. Plenty of fresh air and sunlight soon stop the epidemic. Cerebro-spinal meningitis patients get on well with the use of serum. In regard to typhoid and paratyphoid we have done splendidly. Sometimes, however, the reaction to paratyphoid inoculation is considerable. If the camp water supply were absolutely safe, there would be little or no typhoid. Dr. Park has presented extremely comprehensive and accurate statements in a very interesting paper.

DR. R. W. WILCOX: I desire to record the appreciation and thanks of the congress for the hospitality shown by Drs. Jones, Lichty and Mercur in entertaining us. I wish this statement to be incorporated in the remarks of the president so that our appreciation of the efforts of the local committee on our behalf may be duly noted in the Proceedings of the Congress.

The American Congress on Internal Medicine feels a loss, irretrievable, in the death of our late Secretary General, Dr. Heinrich Stern. For a year or more prior to his death, Dr. Stern was seriously ill but with that never-failing perseverance and unselfishness which he manifested all through his life he forgot his own suffering in the interest of our organization. Prior to the meetings of the congress in 1916 and 1917, a wonderful supply of temporary energy was his, which enabled him to be in attendance in order that we might benefit by his views, that he might guide us with his unflinching judgment. Although he expressed the greatest pleasure after the Pittsburgh meeting, the trip certainly taxed his strength, and this together with the extreme cold which occurred at that time, hastened his death which took place on Jan. 30, 1918.

Upon unanimous resolution of the Council of the Congress, the following Obituary was ordered printed in the Transactions of the year.

Heinrich Stern

was born near Frankfort, Germany, fifty years ago. Soon after arriving in this country he began the study of medicine. He received his first Medical Degree twenty-four years ago and a few years later he took a second degree. After some years in general practice he began to devote himself to a study of diseases of metabolism. The prize offered by the New York County Medical Society for the best essay on diabetes was won by him and this brought him to the notice of the profession. From that time on his work was consistently in the field of internal medicine.

He was connected either as founder or member of the following organizations: The Institute for Medical Diagnosis, Philantropen Hospital, Visiting and later Consulting Physician, St. Mark's Hospital. Consulting Physician, Central Islip and Seney Hospitals. Sometime Professor of Clinical Medicine at the German West Side Post Graduate Medical School. Lecturer on Medicine, Boston University. Founder and Editor of the *Archives of Diagnosis*. Founder of the Manhattan Medical Society, of the American Congress on Internal Medicine, and of the American College of Physicians, which was the fulfilment of a life-long dream.

In addition he was a member of many other medical societies. He was the author of upward three hundred medical articles and of a half-dozen text-

books on medicine, most of which were devoted to treatment of disease in its various phases.

About fifteen years ago, Dr. Stern conceived the idea of a congress of internists, that should not be limited to those in prominent teaching positions but that should be open to all of the profession who were particularly interested in internal medicine—and among those, who by meritorious work, study and investigation had done something for the good of humanity and the profession, a certificate, *causa honoris*, in the American College of Physicians, should be given. These dreams and ideals he repeated time and again to his friends until finally he interested some of his professional brethren who saw the truth and possibilities of his concept. After much labor and deliberation, stimulated and abetted by his enthusiasm, the American Congress on Internal Medicine and its exemplar—The American College of Physicians—were formed. When these were fully organized and had justified his prophecy, it was denied him, as it was to Moses of olden time, that he should see the promised land in the progress and brilliant success of these organizations which will be permanent memorials of their founder and the ideals of the internists and consultant which have become actualities.

REYNOLD WEBB WILCOX, *Chairman.*

THOMAS F. REILLY.

JOSEPH H. BYRNE.

CONSTITUTION

ARTICLE I

This organization shall be known as The American Congress on Internal Medicine.

ARTICLE II

The objects of the congress shall be: To promote the advancement of the science and practice of medicine, to further the study of biological medicine among its members, to elevate the standard of preliminary education of physicians and the standing of medical education, and to secure enactment of just medical laws by the State and Federal Governments and of a Federal Law providing for a national medical license, to obtain the establishment of a National Board of Health, to promote friendly intercourse among physicians, to enlighten and direct public opinion in regard to the great problems of health and medicine, and to unite those working in the domain of internal medicine, to secure recognition for the term internist as the proper designation for such workers and to obtain proper scientific and material recognition of their work.

ARTICLE III

The congress shall meet annually at such time and place as the council may determine. Twenty-five members shall constitute a quorum.

ARTICLE IV

SECTION I. The officers of the congress shall consist of a president, a vice-president, a secretary-general, a treasurer, and twenty-five councilors, who with the officers shall constitute the council, all to be elected from the active membership by ballot at an annual meeting, a majority of whom shall reside in the city of New York or its vicinity, excepting that the secretary-general shall be elected for a term of ten years.

SEC. 2. The council may be convened at any time by the president at the request of any five of its members. Its decisions shall be equivalent to acts of the congress, and shall be reported to it at its next regular meeting. The council shall constitute the nominating committee of the congress.

SEC. 3. A vacancy occurring in any office may be filled by the council.

ARTICLE V

SECTION 1. Any qualified physician engaged in the general or special practice of internal medicine or in laboratory research pertaining to it, may be proposed for fellowship.

SEC. 2. Applications for fellowship in the congress should be made in writing to the council. Five negative ballots shall reject an applicant.

SEC. 3. Applications for fellowship shall be accompanied by the annual dues of five dollars.

SEC. 4. Resignation of fellows shall not be accepted until all dues have been paid.

ARTICLE VI

All proposed changes in the constitution must be offered in writing at a regular meeting of the congress. They are to be considered only at the next annual meeting when a two-thirds vote of the members present shall be necessary for their adoption.

BY-LAWS

ARTICLE I

The President shall preside at the annual meeting of the Congress and deliver an address, and shall be the chairman of the Council. In the absence of the President, the Vice-President shall preside.

ARTICLE II

The secretary-general shall keep a record of the transactions of the congress, and the council, and committees, conduct all corre-

spondence of the congress, and mail to each fellow a program of the meeting at least two weeks in advance of the date thereof. The records, publications and seal of the congress shall be in his custody.

ARTICLE III

The treasurer shall collect all moneys due the congress, disburse the same as directed by the council, keep a proper account of all his transactions, and render an annual statement to the congress. He shall have charge of all property belonging to the congress not otherwise provided for. He shall give bonds for the faithful performance of his duty, in such sum as shall be determined by the council.

ARTICLE IV

The council shall constitute a standing committee to consider all matters of interest to the congress. It shall appoint all committees and conduct all business affairs of the congress. It may, in its discretion, organize special scientific and local sections of the congress.

Five members of the council shall be elected annually by the congress, each to serve for a term of five years.

ARTICLE V

Charges against any fellow must be made in writing. They shall be referred to the council for investigation and action.

ARTICLE VI

The annual dues shall be five dollars, payable before the annual meeting.

ARTICLE VII

The order of business shall be as follows:

- (1) Reading of the minutes of preceding meeting.
- (2) Reports of officers, of the council and committees.
- (3) Presentation of communications.
- (4) Miscellaneous business.
- (5) Election of officers for the ensuing year.

FELLOWS OF THE AMERICAN CONGRESS ON INTERNAL MEDICINE, 1917-1918.

- Aaron, Charles O., Detroit, Mich.
 Acuff, S. D., Knoxville, Tenn.
 Alexander, J. Hope, Pittsburgh, Pa.
 Alsop, Thos., Atlantic City, N. J.
 Amster, J. Lewis, New York City.
 Altshul, H., Hartford, Conn.
 Anders, James M., Philadelphia, Pa.
 Arneill, James Rae, Denver, Colo.
 Aten, William H., Brooklyn, N. Y.
 Baar, Gustav, Portland, Ore.
 Babcock, Robert H., Chicago, Ill.
 Bacon, Theo. T., Springfield, Mass.
 Baketel, H. S., New York City.
 Bangs, Charles H., Boston, Mass.
 Barach, Jos. H., Pittsburgh, Pa.
 Barnes, James, Cicero, Ill.
 Barnes, Noble P., Washington, D. C.
 Bartley, E. H., Brooklyn, N. Y.
 Bate, R. Alex., Louisville, Ky.
 Bathurst, Wm. R., Ark.
 Beck, Harvey G., Baltimore, Md.
 Beling, C. C., Newark, N. J.
 Bell, John M., St. Joseph, Mo.
 Benedict, A. L., Buffalo, N. Y.
 Berg, G. F., Pittsburgh, Pa.
 Berger, Samuel S., Cleveland, O.
 Bettman, Henry W., Cincinnati, O.
 Betts, Lester, Schenectady, N. Y.
 Biddle, Andrew P., Detroit, Mich.
 Bieber, Joseph, New York City.
 Billings, Fredk. T., Pittsburgh, Pa.
 Bishop, Ernest S., New York City.
 Bishop, James, New York City.
 Bishop, L. F., New York City, N. Y.
 Blackwood, A. L., Chicago, Ill.
 Bloch, Leon, Chicago, Ill.
 Blackwood, A. L., Chicago, Ill.
 Bohan, P. T., Kansas City, Mo.
 Bonney, Sherman G., Denver, Colo.
 Bosworth, Robinson, St. Paul, Minn.
 Bowen, William, Knoxville, Tenn.
 Briggs, L. Vernon, Boston, Mass.
 Brockway, Robt. O., Brooklyn, N. Y.
 Brooks, Harlow, New York City.
 Brown, Alex. G., Richmond, Va.
 Brown, Samuel S., Brooklyn, N. Y.
 Buesser, Fredk. G., Detroit, Mich.
 Bumsted, C. R., Newark, N. J.
 Bunker, Henry A., Brooklyn, N. H.
 Burns, G. H., Central Islip, N. Y.
 Burrage, Thomas J., Portland, Me.
 Butler, Glent. R., Brooklyn, N. Y.
 Byrne, Joseph, New York City.
 Byrne, Jos. Henry, New York City.
 Caillé, August, New York City, N. Y.
 Calvert, W. J., Dallas, Tex.
 Carman, Albro R., New York City.
 Cassidy, John M., Jersey City, N. J.
 Chapin, Edward, Brooklyn, N. Y.
 Christie, Arthur C., Corry, Pa.
 Churchill, Jas. F., San Diego, Cal.
 Clark, Ramond, Brooklyn, N. Y.
 Cohen, Bernard, Buffalo, N. Y.
 Collins, Danl. W., Wilkes-Barre, Pa.
 Conklin, C. B., Washington, D. C.
 Connolly, Richard N., Newark, N. J.
 Connor, Guy L., Detroit, Mich.
 Conway, F. C., Albany, N. Y.
 Cooper, W. G., Ogdensburg, N. Y.
 Corbus, B. R., Grand Rapids, Mich.
 Cornwall, E. E., Brooklyn, N. Y.
 Coughlin, Robert E., Brooklyn, N. Y.
 Coulter, F. E., Omaha, Neb.
 Crafts, Leo M., Minneapolis, Minn.
 Cramp, Arthur J., Chicago, Ill.
 Crofton, Alfred C., Chicago, Ill.
 Cruikshank, Wm. J., Brooklyn, N. Y.
 Cullings, Jesse J., Memphis, Tenn.
 Cummings, Rol., Los Angeles, Cal.
 Curtis, Grant P., Union, N. J.
 Cutler, William W., Peoria, Ill.
 Daland, Judson, Philadelphia, Pa.
 Dattelbaum, M. J., Brooklyn, N. Y.
 De Buys, L. R., New Orleans, La.
 De Lorme, M. F., Brooklyn, N. Y.
 Dercum, Francis X., Phila., Pa.
 De Yoanna, A., Brooklyn, N. Y.
 Dickinson, H. S., Philadelphia, Pa.
 Dill, George H., Utica, N. Y.
 Diner, Jacob, New York City, N. Y.
 Dobkin, Nicholas, Brooklyn, N. Y.
 Donald, Wm. M., East Detroit, Mich.
 Donovan, Daniel J., New York City.

Dowd, Ambrose F., Newark, N. J.
 Dowden, C. W., Louisville, Ky.
 Dunklin, F. B., Nashville, Tenn.
 Dunn, A. D., Omaha, Neb.

Eckel, John L., Buffalo, N. Y.
 Edson, David Orr, New York City.
 Egan, Cornelius J., New York City.
 Eichler, Philip, Bronx, New York.
 Elliott, Daniel, Newark, N. J.
 Evans, Britton D., Greystone, N. J.
 Evans, George A., Brooklyn, N. Y.
 Evans, Wm. A., Detroit, Mich.

Fairbairn, Henry A., Brooklyn, N. Y.
 Fassett, Chas. W., Kansas City, Mo.
 Faust, Louis, Schenectady, N. Y.
 Field, C. Everett, New York City.
 Finck, T. D., Louisville, Ky.
 Fishbaugh, E. C., Los Angeles, Cal.
 Fisher, Charles M., Brooklyn, N. Y.
 Fisher, Ernest M., Greystone Park, N. J.
 Flagg, Fredk. W., Rockaway, N. J.
 Fleischaker, F. W., Louisville, Ky.
 Fliedner, G. B., Cleveland, O.
 Fontaine, Bryce W., Memphis, Tenn.
 Friedman, G. A., New York City.
 Friend, John M., Cleveland, O.
 Fuller, Frank M., Keokuk, Ia.
 Futterer, Gus. A., Chicago, Ill.

Gehring, E. W., Portland, Me.
 George, S., Pittsburgh, Pa.
 Gerin, John, Auburn, N. Y.
 Gibson, Arthur R., Buffalo, N. Y.
 Goddard, W. W., Schenectady, N. Y.
 Gompertz, L. M., New Haven, Conn.
 Gordon, Alfred, Philadelphia, Pa.
 Gordon, Murray B., Brooklyn, N. Y.
 Gottlieb, Charles, New York City.
 Gould, L. A., Schenectady, N. Y.
 Grandy, Charles R., Norfolk, Va.
 Granger, Frank B., Boston, Mass.
 Graves, M. L., Galveston, Tex.
 Gray, T. N., East Orange, N. J.
 Graves, Nathaniel A., Chicago, Ill.
 Grayson, Cary T., Washington, D. C.
 Grayson, Thos. W., Pittsburgh, Pa.
 Greeff, J. G. Wm., New York City.
 Greene, Chas. L., St. Paul, Minn.
 Greiwe, John E., Cincinnati, O.
 Griswold, Alex. V., Louisville, Ky.
 Gutman, J., Brooklyn, N. Y.,

Haass, E. W., Detroit, Mich.
 Hall, Josiah N., Denver, Colo.

Halpern, J., New York City, N. Y.
 Ham, Still. S., Schenectady, N. Y.
 Hamilton, H. D., Kansas City, Mo.
 Hangarter, And. H., Brooklyn, N. Y.
 Harrison, Bev. Drake, Detroit, Mich.
 Hatch, J. Leffing'II, New York City.
 Head, Geo. D., Minneapolis, Minn.
 Heller, Jos. M., Washington, D. C.
 Hemmeter, John C., Baltimore, Md.
 Henderson, Max., Louisville, Ky.
 Henschel, L. K., Greystone Pk., N. J.
 Heussy, Wm. C., Seattle, Wash.
 Hiatt, Houston B., High Point, N. C.
 Hickey, Preston M., Detroit, Mich.
 Hill, Eben C., Poughkeepsie, N. Y.
 Hodges, Fred M., Richmond, Va.
 Hodges, J. Allison, Richmond, Va.
 Hoff, Peder A., St. Paul, Minn.
 Hollis, A. Wm., New York City.
 Hollister, Frank C., New York City.
 Holmes, Arthur, Detroit, Mich.
 Horine, Emmet F., Louisville, Ky.
 Horowitz, Philip, New York City.
 Hoxie, George H., Kansas City, Mo.
 Hoxsie, Edward H., Brooklyn, N. Y.
 Hubbard, W. S., Brooklyn, N. Y.
 Hunt, Edward L., New York City.
 Hunter, George G., Los Angeles, Cal.

Inglis, David, Detroit, Mich.
 Ives, Augustus W., Detroit, Mich.
 Ives, Robert F., Brooklyn, N. Y.

Jackson, Edw. W., Rochester, N. Y.
 Jager, Thor., Wichita, Kan.
 Jelly, Arthur C., Boston, Mass.
 Jenkins, Wm. A., Louisville, Ky.
 Jennings, C. G., Detroit, Mich.
 Johnson, George C., Pittsburgh, Pa.
 Johnston, J. I., Pittsburgh, Pa.
 Jonah, Wm. E., Atlantic City, N. J.
 Jones, Allen A., Buffalo, N. Y.
 Jones, Clement R., Pittsburgh, Pa.
 Jones, Frank A., Memphis, Tenn.
 Jutte, Max Ernest, New York City.

Katzenbach, W. H., New York City.
 Kaufman, Albert, Wilkes-Barre, Pa.
 Kaufman, F. J., Syracuse, N. Y.
 Kaufman, Jacob, New York City.
 Kauffman, Lesser, Buffalo, N. Y.
 Kelly, Thomas, New York City.
 Kerr, Le Grand, Brooklyn, N. Y.
 Keyes, F. P., Brooklyn, N. Y.
 Kiefer, Guy L., Detroit, Mich.

- Kimmel, M. S., Republic, Pa.
 King, George W., Secaucus, N. J.
 Kiser, Edgar F., Indianapolis, Ind.
 Klein, Abraham, Brooklyn, N. Y.
 Krafft, Jacob C., Chicago, Ill.
 Lane, Wilfred H., Brattleborough, Vt.
 Lape, George S., Binghamton, N. Y.
 Laporte, Geo. L., New York City.
 Lappens, J. C. S., Binghamton, N. Y.
 Lath, Eugene M., Rochester, N. Y.
 Lee, John, Detroit, Mich.
 Lee, Thomas S., Washington, D. C.
 Levy, I. Harris, Syracuse, N. Y.
 Levy, I. J., New York City, N. Y.
 Levy, Louis H., New Haven, Conn.
 Le Wald, Leon T., New York City.
 Lewi, Emily, New York City, N. Y.
 Lewis, H. Edwin, New York City.
 Lichty, John A., Pittsburgh, Pa.
 Litchfield, Lawrence, Pittsburgh, Pa.
 Little, George F., Brooklyn, N. Y.
 Loewenburg, Saml. A., Phila., Pa.
 Louria, Leon, Brooklyn, N. Y.
 Love, F. W., Buffalo, N. Y.
 Love, Wm. S., Baltimore, Md.
 Loveland, B. C., Syracuse, N. Y.
 Lowrey, James H., Newark, N. J.
 Lucas, C. G., Louisville, Ky.
 Ludlum, W. D., Brooklyn, N. Y.
 Lynch, John C., Bridgeport, Conn.
 Lytle, Albert T., Buffalo, N. Y.
 Magruder, W. Edw., Baltimore, Md.
 Maier, Otto, New York City, N. Y.
 Mallory, Wm. J., Washington, D. C.
 Mannheimer, George, New York City.
 Martland, Harrison S., Newark, N. J.
 Matson, Ralph C., Portland, Ore.
 Mayer, Edw. E., Pittsburgh, Pa.
 Mayhew, John Mills, Lincoln, Neb.
 Meling, Nelson C., Chicago, Ill.
 Meltzer, Victor, New York City.
 Mercur, Wm. H., Pittsburgh, Pa.
 Meuer, S. H., New York City, N. Y.
 Meyers, Sidney J., Louisville, Ky.
 Monae-Lesser, Mozart, N. Y. City.
 Mooney, Louis M., New York City.
 Moore, Ross, Los Angeles, Cal.
 Moren, John J., Louisville, Ky.
 Morgan, Jas. D., Washington, D. C.
 Morgan, Wm. G., Washington, D. C.
 Morrison, A. W., Minneapolis, Minn.
 Moses, Henry M., Brooklyn, N. Y.
 Mulligan, Wes. T., Rochester, N. Y.
 Mulhearn, W. A., Augusta, Ga.
 McBlaine, T. J., Niagara Falls, N. Y.
 McCaskey, Geo. W., Ft. Wayne, Ind.
 McCaughey, Robt. S., Mason City, Ia.
 McClanahan, H. M., Omaha, Neb.
 McCreedy, E. B., Pittsburgh, Pa.
 McCrudden, Francis H., Boston, Mass.
 MacEvitt, James M., Brooklyn, N. Y.
 McGraw, T. A., Jr., Detroit, Mich.
 McGruder, W. Edw., Baltimore, Md.
 McKelvey, James P., Pittsburgh, Pa.
 McPherson, O. P., Kansas City, Mo.
 McSweeny, E. S., New York City
 Nash, Philip I., Brooklyn, N. Y.
 Nilson, C. Stuart, Tacoma, Wash.
 Nisbit, W. C., Charlotte, N. C.
 Norbury, Frank P., Springfield, Ill.
 Norden, H. A., Chicago, Ill.
 Northridge, W. A., Brooklyn, N. Y.
 O'Hail, Joseph C., Pittsburgh, Pa.
 O'Mara, John T., Baltimore, Md.
 Orbison, Thos J., Los Angeles, Cal.
 Overton, W. T., Binghamton, N. Y.
 Palmer, G. A., Pittsburgh, Pa.
 Pease, Marshall C., New York City.
 Peers, Robert A., Colfax, Col.
 Pettit, Albert, Pittsburgh, Pa.
 Pfeiffer, Felix, New York City.
 Philips, Carlin, New York City.
 Pollak, B. S., Secaucus, N. J.
 Polozker, I. L., Detroit, Mich.
 Pottenger, F. M., Monrovia, Cal.
 Pryor, John H., Buffalo, N. Y.
 Pumpyea, P. C., New York City.
 Putnam, James W., Buffalo, N. Y.
 Quackenbos, H. F., New York City.
 Quintard, Edward, New York City.
 Ramirez, Max A., New York City.
 Reed, Edw. H., Washington, D. C.
 Reed, Fred C., Schenectady, N. Y.
 Reed, Ralph G., Central Islip, N. Y.
 Reeves, Rufus S., Philadelphia, Pa.
 Reifenstein, E. C., Syracuse, N. Y.
 Reilly, T. F., New York City, N. Y.
 Rice, James F., Buffalo, N. Y.
 Richardson, E. J., New York City.
 Robinson, D., New York City.
 Rochester, Delancey, Buffalo, N. Y.
 Roebuck, L. L., Richwood, O.
 Rooney, James F., Albany, N. Y.
 Rothenberg, L. H., New York City.

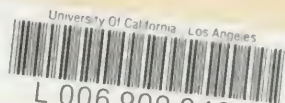
- Rottenberg, I. M., New York City.
 Roussel, Albert E., Philadelphia, Pa.
 Roy, Philip S., Washington, D. C.
 Ryan, Granville W., Des Moines, Ia.
 Sachs, Adolph, Omaha, Neb.
 Sachs, L. B., New York City, N. Y.
 Sajous, Chas. E. de M., Phila., Pa.
 Salzman, Samuel, Toledo, O.
 Sargeant, L. D., Washington, Pa.
 Satterthwaite, T. E., New York City.
 Schapira, S. Wm., New York City.
 Schlapp, Max G., New York City.
 Schweikhart, Fred. J., Elmhurst, N. Y.
 Scott, George D., New York City.
 Scott, J. M. W., Schenectady, N. Y.
 Seufert, E. C., Chicago, Ill.
 Shearer, Thos. L., Baltimore, Md.
 Sheldon, Wm. H., New York City.
 Sherman, G. H., Detroit, Mich.
 Sherrill, A. W., Pittsburgh, Pa.
 Sillo, Valdemar, New York City.
 Simonton, F. A., Pittsburgh, Pa.
 Slaymaker, Samuel R., Chicago, Ill.
 Smith, A. D., Brooklyn, N. Y.
 Smith, Ernest B., Philadelphia, Pa.
 Smith, John Hall, Boston, Mass.
 Smith, Joseph E., Brooklyn, N. Y.
 Smithies, Frank, Chicago, Ill.
 Soiland, Albert, Los Angeles, Cal.
 Somers, J. A., Brooklyn, N. Y.
 Stapleton, Wm. J., Detroit, Mich.
 Stark, M., New York City, N. Y.
 Stearns, Wm. G., Chicago, Ill.
 Steiner, Edwin, Newark, N. J.
 Stella, Antonio, New York City.
 Stewart, C. E., Battle Creek, Mich.
 Stewart, F. E., Philadelphia, Pa.
 Stewart, W. B., Atlantic City, N. J.
 Stewart, W. H., New York City.
 Stillman, Edgar R., Troy, N. Y.
 Stith, Robert M., Seattle, Wash.
 Stone, Warren B., Schenectady, N. Y.
 Stoner, Willard C., Cleveland, O.
 Strietmann, Wm. H., Oakland, Cal.
 Strodl, George T., New York City.
 Swan, John M., Rochester, N. Y.
 Swink, Walter T., Memphis, Tenn.
 Teeter, Charles E., Newark, N. J.
 Thoms, Fridolin, Buffalo, N. Y.
 Thorne, F. H., Greystone Pk., N. J.
 Thorne, J. M., Pittsburgh, Pa.
 Tice, Frederick, Chicago, Ill.
 Tichenor, G. H., Jr., New Orleans.
 Titus, Edward C., New York City.
 Trapp, Albert R., Springfield, Ill.
 Tuley, Henry Enos, Louisville, Ky.
 Tuohy, E. L., Duluth, Minn.
 Turck, Fenton B., New York City.
 Ullman, Julius, Buffalo, N. Y.
 Updegraff, R. K., Cleveland, Ohio.
 Utley, Frederick H., Pittsburgh, Pa.
 Van Cott, J. M., Brooklyn, N. Y.
 Vander, Bogart F., Schenectady, N. Y.
 Vander Hoof, D., Richmond, Va.
 Van Wart, R. M., New Orleans, La.
 Vaux, Chas. L., Central Islip, N. Y.
 Verbrycke, J. R., Washington, D. C.
 Visscher, Louis G., Los Angeles, Cal.
 Von Ruck, Silvio, Asheville, N. C.
 Von Tiling, J. H. M. A., Poughkeepsie, N. Y.
 Voorsanger, Wm. C., San Fran., Cal.
 Wachsmann, S., New York City.
 Walsh, Thomas J., Buffalo, N. Y.
 Warfield, Louis M., Milwaukee, Wis.
 Warmuth, M. P., Philadelphia, Pa.
 Warren, L. F., Brooklyn, N. Y.
 Watkins, John T., Detroit, Mich.
 Weber, Leonard G., New York City.
 Webster, Henry G., Brooklyn, N. Y.
 Weinstein, J. W., New York City.
 Weiss, Samuel, New York City, N. Y.
 Welker, Franklin, New York City.
 Wendel, Henry C., Cincinnati, O.
 Wessels, W. F., Los Angeles, Cal.
 Westervelt, H. C., Pittsburgh, Pa.
 Wheeler, Robert T., Brooklyn, N. Y.
 Whelan, Edward P., Nutley, N. J.
 Wilcox, R. W., New York City.
 Williams, J. R., Rochester, N. Y.
 Wilson, C. S., Tacoma, Wash.
 Wilson, Walter J., Detroit, Mich.
 Winter, Henry Lyle, Cornwall, N. Y.
 Wiseman, Jos. R., Syracuse, N. Y.
 Witherspoon, J. A., Nashville, Tenn.
 Witter, Orin R., Hartford, Conn.
 Wolf, I. J., Kansas City, Mo.
 Youngling, Geo. S., New York City.
 Zbinden, Theodore, Toledo, O.
 Zueblin, Ernest, Baltimore, Md.
 Zugsmith, Edwin, Pittsburgh, Pa.

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